ANUMUKTI

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Action Alert Kakrapar

The floods were bad enough but the Incompetence of authoritios knows no bounds

Following the heavy rains of June 15 and 16, floods devastated the Kakrapar Atomic Power Station (KAPS) as was reported in our last issue. The fury of the floods was such that it not only drowned 80 motors and pumps in the turbine room, but broke the waste management facility and lifted canisters of solid radioactive waste and carried them out into the open. However the flood was not strong enough to shake the complacency and arrogance of nuclear and civic authorities. They have continued their policy of deception and bland 'trust us' reassurances. No effort has been made to inform and educate the public especially those living in the vicinity of the station. The incompetence and callousness of the nuclear authorities and the ignorance coupled with the high-handed attitude of the civic authorities together is in itself a serious hazard to public safety.

Ducts and storm drains connect the turbine building of KAPS to the Moticher Lake situated just behind. The lake is not a natural lake but a man-made lake and has gates situated near the village of Ratania to control the flow of water. Following heavy rains on June 15, the level of the Moticher Lake began to rise. The outlet ducts became inlet pipes and water began entering the turbine building on the night of June 15th itself. By the morning of June 16th, there was water not only in the turbine building but in other parts of the reactor complex. The morning shift had to swim in chest high water to get to work and the control room according to one rumour was "inaccessible for some time".

The floodwaters breached the solid waste management facility and lifted canisters of waste and carried them out into the open. Since the authorities have not been forthcoming with detailed information (See page 3 and 4), it is not known exactly how many canisters were swept away. The original news-report spoke of four but the KAPS superintendent said only one had been lifted and whose lid had become "loose".

What Did The Authorities Do?

First of all they slept; then they bickered among themselves; after that they issued misleading and erroneous statements to the press;(See Collector D.P.Trivedi's statement on page 4) blamed and cursed "troublemakers" and "vested interests"; and finally they slept again.

All these years, the gates of Moticher Lake at Ratania were never operated so much so that according to the authorities' own admission (page 4) "A lot of grass has grown very tall near the gates." Even as the

flood waters were entering the turbine building on the night of June 15th and causing havoc, the KAPS authorities slept. No action was taking till the "gentlemanly' hour of 11 O'clock on 16th morning when a site emergency was declared and workere evacuated. (My guess is this action was taken due to the 'automatic' radiation monitoring unit detecting radioactivity in the environment.)

After the situation had become desperate and there was water, water everywhere, the KAPS authorities woke up and started frantically asking the district and the state authorities to use their influence to get the gates of the Moticher Lake opened. However, the gates after years of neglect could not be opened. Nearby villagers, worried about the security of their own homes, caused a breach in the embankment of the lake which allowed the waters to drain out. It was only on 18th of June that a large pump was brought to Kakrapar from Tarapur, that the work of removing the water from the turbine building could begin.

The KAPS authorities did not think it their duty to inform the public or even the Atomic Energy Regulatory Board (See Editor's commentary on page 5) of the events that had taken place. Whatever information that did come out was not because of but despite their doing. Reporters from *Abhiyan* and *Gujarat Samachar* along with yours truly happened to visit Kakrapar in connection with a different article on nuclear power. The KAPS authorities refused to talk; but workers showing a greater sense of responsibility did. It was only after the report was published that the KAPS authorities and the collector of Surat issued their statements.

The statements that they did issue display an economy with truth that would be commendable if applied to public funds. For instance, the district collector says in his statement (See page 4) "Before starting the reactor, it had been subjected to all the stringent tests and conditions." This statement might be true but it is equally true that the reactor did not pass all the tests. The Emergency Core Cooling System for one did not work as expected during the test and needed "fixing". As admitted by the present chair of the Atomic Energy Regulatory Board in an interview with. *The Telegraph*, the system was not again subjected to the same test to see if the fix worked. Similarly the contention in Mr. Trivedi's statement that had the reactor been in operation, there could not have been any accident is more hype and hope than fact. The authorities had no control over the amount of water that was entering the building and not only the regular electricity supply but also the diesel emergency power supply could have been disrupted reminiscent of the situation during the Narora fire of last year.

Had there been an off-site emergency needing evacuation of people, there was no way that it could have been accomplished in a reasonable time-frame. The floods had caused havoc to roads and bridges. Even now, three months after the event, it takes more than an hour to traverse just 15 kms on the highway with a motorcycle. Less manoeuvrable vehicles like trucks and buses take longer and there are large number of trucks turned turtle dotting the highway. The condition of side-roads in some cases is much worse.

What Can You Do?

Show and express your solidarity with the people living around Kakrapar who in their hundreds are writing letters to their elected representatives and the Chief Minister of Gujarat demanding an all-party commission of inquiry. You can send your letters to the Prime Minister, the Minister for Environment, your local MP, chairman DAE and of course the Chief Minister of Gujarat. Please send a copy also to us. In this letter, please ask for:

Constituting an all-party enquiry committee which would investigate and report to the public in a reasonable time. The committee should look into the following:

- What were the reasons for the delay of at least 12 hours between the flooding of the turbine room and the declaration of site emergency?
- What were the reasons for declaring the site emergency?
- Why were the people living in the vicinity (within 30 kms) of the plant, not informed of the situation?
- What was the extent of the damage to the waste management area? How many waste filled drums are kept at different locations within the KAPS premises? What are the contents of these drums?
- What amount and kinds of radionuclides were released to the environment? What are their long term implications for public health?
- How do the authorities propose to evacuate the public in case of emergency during monsoons when the condition of the roads makes the task impossible?

Neither the stalled unit-1 nor the completed but yet to be started unit-2 should be allowed to start functioning before the committee satisfies itself that public safety would be maintained in case of emergency. The report of the committee should be made public and published in newspapers.

Surendra Gadekar

The Official Response fo Kakrapar Flooding

The chief superintendent of Kakrapar Atomic Power Project Mr. J. B. Kalaiya, along with other high officials of the project visited the Surat office *of 'Gujarat Samachar'* subsequent to the publication of the report regarding the flooding of the Kakrapar plant following the rain of June 15th and 16th. While he had himself refused to meet journalists only the day before, Mr Kalaiya eagerly and on his own initiative sought an interview after the publication of the report. The following is a translation of the interview. We are reproducing it because this is the sum-total of the official response. In the following Q. stands for the interviewer of Gujarat Samachar and A. for Mr. Kalaiya.

Q. What has been the total damage to the plant?

A. There has been no damage to the pumps and motors as such. No machinery has been destroyed. *However,* some repairs would be needed whose labour costs could run up to Rs 10 lakhs.

Q. How much water had entered the plant on June 15th?

A. Water had not entered into all the installations in the plant.

Q. Is it true that there is 56 tonnes of uranium stored in the plant?

A. I am not at liberty to answer this question and confirm or deny whether there is uranium stored in the plant.

Q. Was the plant shut down?

A. Yes.

Q. If the plant had been operating and these pumps had drowned what would have happened?

A. We have three separate and independent systems which can shut down the plant within seconds in case it had been operating.

Q. How much water entered the turbine building?

A. There was 25 feet of water in the turbine building.

Q. WAS site emergency declared in the plant?

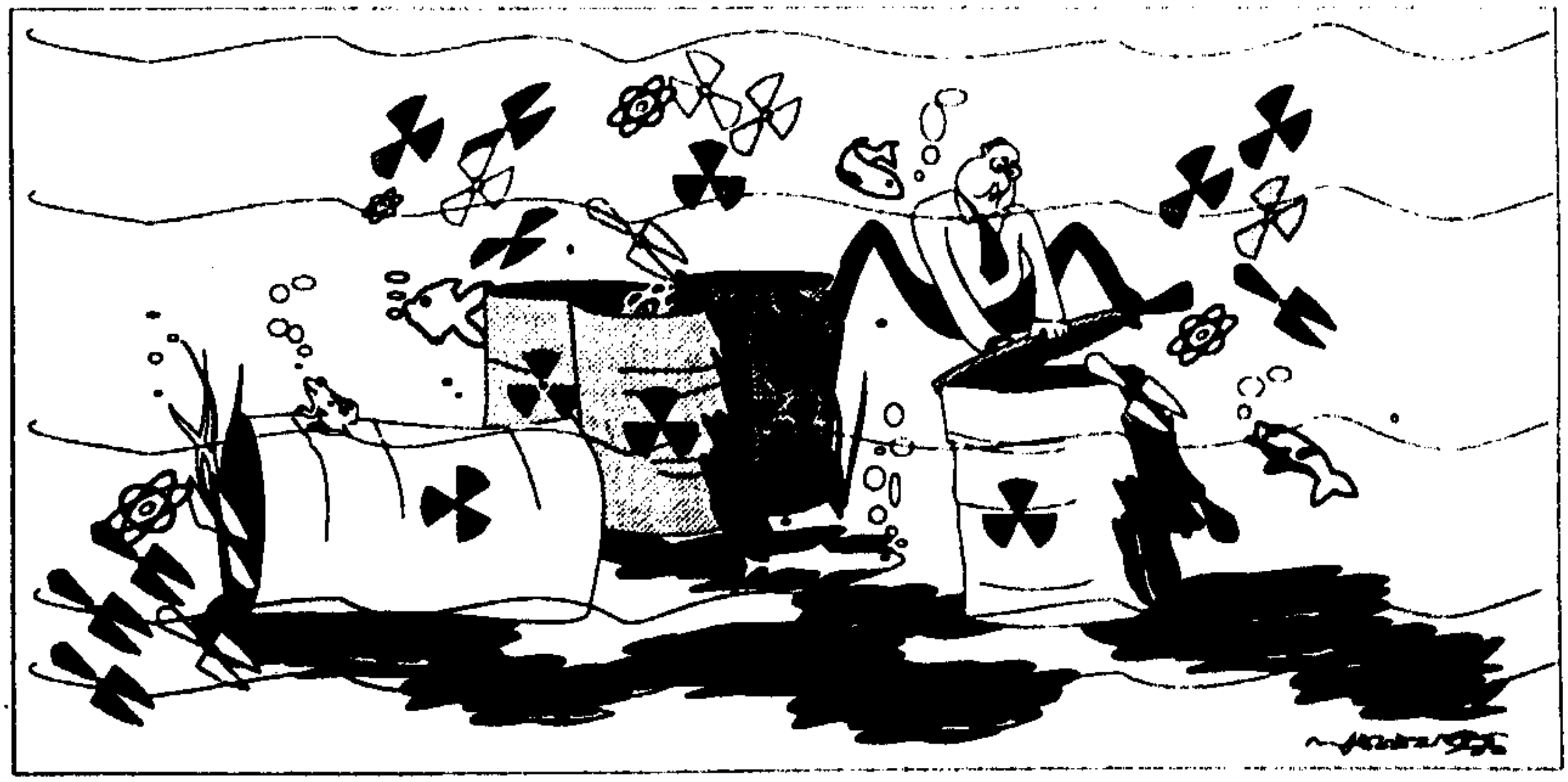
A. Yes, we declared site emergency at 11 A.M. on 16th June.

Q. When will the plant start again?

A. We expect it to start in the second week of July.

Q. Is there a 'monsoon committee'and who are its members?

A. Yes. There is Mr Sinha who is an administrator and there are some seven to eight engineers.



kakrapur 1994

Notice of Shri D.P.Trivedi Collector, Surat

The Kakrapar Atomic Power Station is this country's fifth and most modern atomic power station. This atomic power station has been built within schedule despite adverse circumstances at a cost of around Rs. 1350 crores. It adheres to the highest internationally accepted safety standards. Before starting the reactor, it had been subjected to all the stringent tests and conditions imposed by the government appointed Atomic Energy Regulatory Board. The design of the atomic power plant takes into consideration site specific factors such as geographical conditions, the rainfall and flood patterns of the last 40 years, and the arguments of seismic experts. On 15th and 16th of June, due to inconceivably heavy rainfall in the whole area and the extremely fast rise in the level of the Moticher Lake and the Kakrapar dam catchment area, affected the whole area and also the plant. There was more than 9 feet of water flowing above the Kakrapar weir. In circumstances beyond human and plant management control, this water had entered the turbine room of unit-1 and unit-2 and the pump house through storm drains and the inlet pipes from the Moticher Lake. In these circumstances, the plant engineers had closed the gates on inlet pipes of the pump house and a site emergency was declared at 11 O'clock as per prescribed procedures and all efforts were made by the workers to remove the water from the plant. The reactor was in a shutdown state at the time, but had it been operating it could have been shutdown within a few seconds. This plant uses natural uranium only 0.7% of which is fissionable. Had these circumstances arisen when the plant was operating, the resultant steam would have gone into the reactor building, it would have gone into the suppression pool of the reactor building and would have condensed into water. These safety features are part of the reactor's safety system and there is no fear whatsoever that had the reactor been in operation when the flooding took place than half of Gujarat would have been affected by the explosion. Today (June 22nd, 1994) after having made an inspection, I am making this statement as the off-site emergency director of the plant to bring these facts for the attention of the public.

Q. Why did it not take measures to prevent the flooding of the plant?

A. The committee's work is to deal with ordinary rain.

Mr. Dipak (Technical Services Superintendent):

What happened was beyond anybody's imagination.

Q. What is the condition at present of unit-1 and unit-2?

A. All together about 40 motors in unit-1 and the same number in unit-2 have water in them.

Q, Was the Ratania gate of the Moticher Lake opened?

A. Mud has collected around the Ratania gates of the lake. Actually, there is an island in the lake and the gates are on this island. A lot of grass has grown very tail near the gates. The gates are manually operated. Despite lot of effort the gates of the lake could not be opened.

Q. Had the gates been opened would it have made any difference?

A. Certainly it would have made some difference.

Q. I hear that valuable records have also got destroyed in the flood.

A. Well, records... A little bit... some account books, correspondence regarding plant construction, some drawings, and other stationary has been destroyed.

Q. What is the condition of the computers?

A. Some computers bought in 1985 and 1986 have suffered some damage.

Q. So, really there has only been damage worth Rs 10 lakhs?

A. Yes. There is of course the production loss. The plant was to have started on the 16th of June. That did not happen. If the plant operates at full capacity, then there is a loss of Rs One crore for every day that the plant gets delayed.

The next 'event' took place on 29th June with the publication of a report in *Gujarat Mitra* which claimed that during the floods on 15th June, the water had breached the waste management facility and four drums of solid radioactive waste had been swept away. The containers, according to the paper had spilled some of the contents outside, which had been collected later by the authorities. The paper talked about the threat posed to Surat city which is downstream of Kakrapar on river Tapti.

Since this was a 'sensational' disclosure, all the inhabitants in villages around Kakrapar including the Anumukti team were waiting with baited breath for an official response. However, there was no response at all till the 8th of July; when the district collector Mr. D.P.Trivedi was invited along with a large posse of pressmen from Surat to Kakrapar for a briefing. In the briefing, Mr. Kalaiya repeated most of the things he said in his previous interview with *Gujarat Samachar*. Regarding the waste, the statement of Mr. Kalaiya were reported differently by different newspapers.

The *Indian Express* said:
"Mr. Kalaiya described as misleading a report in a local daily that four drums containing nuclear waste had been swept away by swirling waters resulting in a leak of radio-active material from the drums. He agreed that water had seeped into the two-metre trench meant for keeping these drums but no drum had been swept away. One of the drums had been lifted a little by the water and from it a container with the waste inside had come out. But he said, the container had not opened ruling out the possibility of leakage of material. "But despite this, we took samples of the water in the trench, tested it and sent the report to the Gujarat Pollution Control Board," he said. The test had not found any contamination, according to him.

"Besides, Mr. Kalaiya explained that the waste stored here was that which was left during clean ing-up and maintenance of the plant. This waste was very low active and had radioactivity of less than 0.03 MR, he added. The more radioactive wastes were being reprocessed at Tarapur and was not released into the atmosphere, according to him.

On the other hand, *Gujarat Mitra* had this to say regarding Mr. Kalaiya's remarks regarding the waste.

The rainwater which entered the plant in flood force had breached the spot where radioactive waste is stored in special cans. The lid of one of the cans had become loose due to which the radiation monitoring unit had automatically started. Experts had immediately begun to study whether radiation had spread to various neighbouring zones. Wind direction, water, soil and cattle samples were examined and so also different samples were collected. Nothing has come out which can be a cause of any worry. There is regular sampling of radiation in the zones adjacent to the reactor."

Gujarat Mitra also reports that Mr Kalaiya had also appealed to the neighbouring public not to give way to panic and informed that he the chief superintendent of KAPS, the district collector, the police commissioner, the chairman of Atomic Energy Regulatory Board, were in contact 24 hours through telephone, telex, satellite channel, wireless etc. So that even in case of an accident these worthies would have been informed immediately.

There has been no further word from either the district collector or Mr. Kalaiya the station superintendent of Kakrapar since the 8th of July, and it seems as if they have decided that the matter is closed.

Editor's Commentary

Since the *Indian Express* and the *Gujarat Mitra* reports regarding Mr Kalaiya's explanation about the waste and swirling waters are so radically different, one claiming that no waste was spilled at all, while the other saying that it did and talking about the automatic radiation monitoring unit getting started, I will leave it to the reader to come to his or her own conclusions as to what actually took place that fateful day.

I would only like to make a small comment regarding Mr. Kalaiya's use of numbers and units. I find this 'scientific' rigmarole a regular feature of nucleocrats' efforts at 'educating' the public. Units for radioactivity are becquerrels (one disintegration per second) and curies (3.7×10^{10} disintegration per second). There is no unit of activity called MR. Presumably what is meant by this MR is milli-rem. Rem is a unit of dose. If one knows the activity of the waste cannister and what kind of waste there is and what kind of radiation it emits and the energy of that radiation then one can calculate the dose per unit of time that the can emanates. Capital M is usually used to denote mega (million) rather than milli (thousandth) which is denoted by small m. In any case, the 0.03 MR still does not make any sense since no time interval has been specified.

On July 18, 1994 I wrote Dr. A. Gopalakrishnan, the chair of Atomic Energy Regulatory Board, a letter informing him of what Mr. Kalaiya had said to newspapers and requesting information regarding when the AERB was officially informed.

As luck would have it I met Dr. Gopalakrishnan himself in Delhi on the 8th of August at a meeting called by INTACH—a voluntary organisation which wants to organise a national workshop on 'Nuclear Safety and the Public' on February 3rd and 4th, 1995. The first thing Dr. Gopalakrishnan said to me was, "I have received your letter and you will be getting a reply soon."' I have still (31st of August, 1994) not received any reply to this letter

But I did ask Dr. Gopalakrishnan the same questions and his oral replies are the following:

Regarding waste, he said that the canisters were not totally filled and hence they had buoyancy and as a result they floated in the water and had to be searched and fished out. But they had not opened. On my asking him if that were the case then how come the radiation monitoring unit had automatically kicked-off, he had no answer. He said that he would be visiting Kakrapar on August 24th and would make it a point to meet us. However, he hasn't come as yet.

Regarding when he was informed by the KAPS authorities about the flooding he said that he came to learn of it on June 23rd, when *Gujarat Samachar* carried the story. So much for the 24 hours contact with telephone, telex, satellite chanel, wireless, etc.

A National Treasure Or A Global Security Risk

What To Do With Hugo Stocks of Surplus Plutonium?

Ite makers had hoped that plutonium would lead the world to a utopia created by a boundless source of energy. Glen Seaborg, who led the team that first isolated it, felt that plutonium would provide the energy to make deserts bloom and enable "planetary engineering"; there would be earth to moon shuttles; sea water would be made potable. "My only fear is that I may be underestimating the possibilities," he said in 1968.

> *"The plutonium we no longer need for weapons is a global security risk and an economic liability."*
>
> *Hazel O'Leary,*
> *US Energy Secretary*
>
> *"Plutonium has essentially a negative economic value,"*
>
> *John Gibbons, Scientific*
> *Advisor to President Clinton*

The Indian establishment as also the Russian, has a similar view. They both see plutonium as the currency of power—the gold of the nuclear age. The direction of nuclear energy policy in India is towards establishing a plutonium based programme.

Right now, India is a long way off from this goal. Although, our reactors produce a good deal of plutonium in the spent fuel, it comes mixed with all kinds of highly radioactive fission products that need to be separated out before one can obtain the plutonium in a usable form. This process is known as reprocessing. India has a small reprocessing facility at Trombay and a slightly bigger one at Tarapur. Another reprocessing plant is undergoing construction at Kalpakkam in Tamil Nadu. However, obtaining enough plutonium for a full reactor load from these reprocessing plants would still take years. Having enough plutonium for making a bomb is another matter and we have already demonstrated our ability to do that twenty years ago.

The Scale of the Problem

The Americans and the Russians are in a different position altogether. During the Cold War, each had produced huge quantities of plutonium and highly enriched uranium (HEU) at enormous cost in money, health and environmental damage.

With the arms race winding down, these large stocks of plutonium and HEU are coming out of weapons. Over the next decade at least 50 tons in the United States and probably a little more in Russia. In addition, there is some 33 tons or more of 'other plutonium" found around nuclear weapon's complex in the US alone, much of it scrap and other forms not easily made into fuel.

It is crucial that this surplus weapons plutonium be managed in a way that minimises the danger that it will be re-used for weapons by the initial possessor nation, another nation, or a sub-national group; strengthens national and international institutions and incentives for control and reduction of nuclear weapons; does not lead to increased accessibility of civilian plutonium for weapons use; and meets reasonable standards for safety, health, the environment and cost.

Highly enriched uranium does not constitute a proliferation risk. It can be easily diluted with natural uranium so that the resultant is no longer so highly enriched and cannot be used for making bombs. Recovering bomb-usable material from diluted HEU requires technologically demanding and costly isotopic separation. In contrast, plutonium offers no such possibility of "denaturing".

The Russians, even after fifty years of experience with plutonium still regard it as an asset not a liability It is, as one official put it, "a national treasure", to be husbanded now in order to produce boundless energy for future generations. Besides the plutonium in weapons, there are large plutonium stocks accumulated for use in power plants. Russia is also planning a new generation of nuclear power plants called breeders that create more plutonium than the nuclear fuel they consume. And that plutonium, while not as pure as that from weapons, would still be readily usable by weapons makers.

What is more, senior Russian officials say they plan to pay for these costly plants in part with dollars from the US government money that the Russians will earn from a contract to sell America highly enriched uranium.

The United States has contracted to buy Russian HEU to use it in civilian reactors for energy, but the real American purpose was to reduce the chances of theft or sales on the world market, a goal that could be undercut by the Russians use of the revenues to build breeder reactors.

Thus, the gap in attitudes about the nuclear legacy looms large.

Russia wants to keep its surplus plutonium in a pure form, the form in which it is used in weapons. This would make it attractive to terrorists or nations that want such a weapon; as little as four kilograms, would be enough. Even without thefts, the more plutonium that remains in an easily accessible form in either country, the easier it would be for a future Russian or American government to rebuild a giant nuclear arsenal quickly.

While American officials believe their own stockpiles are safely guarded for now, they argue that disposal of plutonium now could help protect future generations. The United States, which first synthesized plutonium and has spent billions of dollars and done substantial damage to the environment and human health in the process, is ready to dispose of it. The question is how!

Plutonium is a Ilability

The US National Academy of Sciences (NAS) issued a report in January 1994, entitled *Management and Disposition of Excess Weapons' Plutonium.* The report examines the problem of the management and disposition (long-term management) of plutonium from unwanted nuclear weapons at the end of the Cold War.

The report warns that excess military plutonium poses high security risks and at the same time affords no economic advantage for the foreseeable future. It states that "exploiting the energy value of plutonium should not be a central criterion for decision-making, both because the cost of fabricating and safeguarding plutonium fuels makes them currently not competitive with cheap and widely available low-enriched uranium fuels, and because whatever economic value this plutonium might represent now or in the future is small by comparison to the security stakes."

Plutonium Storage:

In the nuclear weapons complex, plutonium is primarily found in three forms: plutonium metal, plutonium oxide and plutonium nitrate solutions. Each form poses its own set of potential problems that may result in the release of plutonium from storage containers or create difficulty in handling. Plutonium metal reacts with oxygen in air (or corrodes) to form plutonium oxides. Of these oxides plutonium dioxide ($PuO2$) is the most prevalent. The formation of plutonium dioxide from plutonium metal is accompanied by release of heat and a large expansion in volume, which may breach the primary storage container according to the US Department of Energy's own assessment.

Plutonium oxide normally consists of small particles. If not properly contained, such particles can easily be dispersed and inhaled. Plutonium oxide has the ability to adsorb (to stick: see box on jargon) water and organic molecules on its surface. If the container (and thus the plutonium inside it) is heated, or if chemical reactions within the container raise the temperature, any adsorbed water on the plutonium may be released as steam, building up the pressure in the container. Pressurisation can also occur when the adsorbed materials are slowly released over time. In addition, the adsorbed molecules are subject to radiation from the plutonium, which can chemically break them up. The process of chemical breaking of molecules under the action of radiation is called radiolysis. Radiolysis can also cause problems in the packaging of materials; any plastic in the packaging, for example, may disintegrate. Unfortunately, the DOE wrapped and sealed many containers in plastic bags in an effort to minimise the spread of contamination. A breach of the primary containment would therefore put plutonium in contact with the plastic. Radiolysis of some types of plastic bags releases hydrogen and gaseous hydrochloric acid, both of which react with the container material and the plutonium metal. There reactions increase the risk of fires; some of them also release heat within the container. Such reactions in turn increase the risk that the plutonium will not be contained.

Other kinds of hazards can result from other material properties of plutonium. In some case, plutonium is pyrophoric (spontaneously igniting in air). Clean plutonium metal does not burn at room temperature, but the higher temperatures associated with machining plutonium metal have caused numerous fires in the finely-divided plutonium metal machine scraps. Secondly, the decay of short-lived plutonium-241 yields americium-241, which emits penetrating gamma radiation and can thus cause worker exposure. Spills and criticality are important concerns for plutonium nitrate solutions.

The NAS analysis shows that even when the plutonium itself is assumed to be "free", it costs more as an energy source than uranium because plutonium processing and the fabrication of fuel containing plutonium is so expensive. (In most cases, plutonium is used in a reactor fuel known as MOX a mixture of oxides of plutonium and uranium).

The report also discusses the issue of "civilian plutonium", or plutonium recovered from reprocessing spent

It Pays To Increase Your Jargon Power

1. *pits*

a. a sassy cologne for the manly man; let her know how base you can be

b. what John McEnroe thinks of referees and linesmen

c. a hollow sphere of plutonium-239 or uranium-235 metal. It is the trigger of nuclear weapons — the first part of a nuclear explosion in the primary stage of a nuclear weapon.

2. *pyrophoric*

a. having a phobia of spontaneously catching on fire

b. an obscure eighteenth century term that referred to pirates who had successfully found treasure. It eventually was used by royalty to express a feeling of euphoria (as in "totally pyrophoric, Duke")

c. the ability to ignite spontaneously in air. Several metals used in the nuclear fuel cycle, such as liquid sodium, plutonium and uranium, are pyrophoric to varying degrees. The latter two metals have an increasing likelihood to spontaneously ignite with rising temperatures or decreasing particle size. However, they are not pyrophoric at room temperature.

3. *vitrification*

a. an especially cruel form of medieval torture involving the force feeding of vitamin supplements

b. the transformation of a sincere and sweet child into a vitriolic teenager

c. to convert into glass. In the nuclear arena, vitrification refers to the glassification of radioactive waste, mixed waste or materials such as plutonium

4. *adsorption*

a. the manner in which humans have long-term memory of television commercials

b. the rate at which various billboard materials succumb to the ravages of birds

c. the sticking of molecules to the surface of a liquid or solid. Adsorption is different from absorption, which involves taking molecules in through pores or soaking up

5. ro*diolysis*

a. the process by which listening to the radio turns you into a couch potato

b. a special hair treatment for bald people

c. the change in the chemical form of a substance caused by the action of radiation

6.MOX

a. a state of utter and complete thoughtlessness. From Sanskrit Moksha. Indian nucleocrats are said to attain this state of mind as they contemplate replacing enriched uranium fuel for the Tarapur reactors

b. a very virulent form of small-pox which left the afflicted mentally retarded

c. from mixed oxide fuel; a way to utilising plutonium by mixing it with uranium for use in light water reactors

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fuel from civilian power plants. Recognizing the security risks from all separated plutonium, including that in civilian nuclear power programs, it recommends that the US and Russia "pursue a reciprocal regime of secure, internationally monitored storage of fissile material, with the aim of ensuring that the inventory in storage can be withdrawn only for non-weapons purposes." As Russia continues to experience severe economic problems and political uncertainty, this is a crucial and very urgent recommendation.

The report also implies that civilian plutonium is a liability, comparing it with producing oil from shale rock, which will remain uneconomic for decades, but which poses no comparable security risk.

Recommandations

The NAS report recommended the possible use of MOX as one long-term plutonium disposition option. If MOX were used in existing nuclear reactors, the plutonium remaining in the waste would be sufficiently mixed with radioactive fission products that it could not be used in weapons without costly and dangerous processing. Alternatively, the report suggested mixing excess plutonium with radioactive wastes and molten glass a process known as vitrification.

Both of these options would make it difficult, costly, and dangerous to re-extract the plutonium for use in weapons. The criterion by which these options were adjudged suitable was the "spent fuel standard" that is, it should be at least as difficult to make weapons from unreprocessed spent fuel from civilian nuclear power plants.

The report also recommended considering deep boreholes (two to four kilometers deep) for evaluation as a disposal option, but recognized that retrievability from such boreholes could cause problems because, in that case, the plutonium could be re-used to make nuclear warheads. On the other hand, the report notes that retrievability might be an advantage in negotiations with the Russian government, which views plutonium as an economic resource.

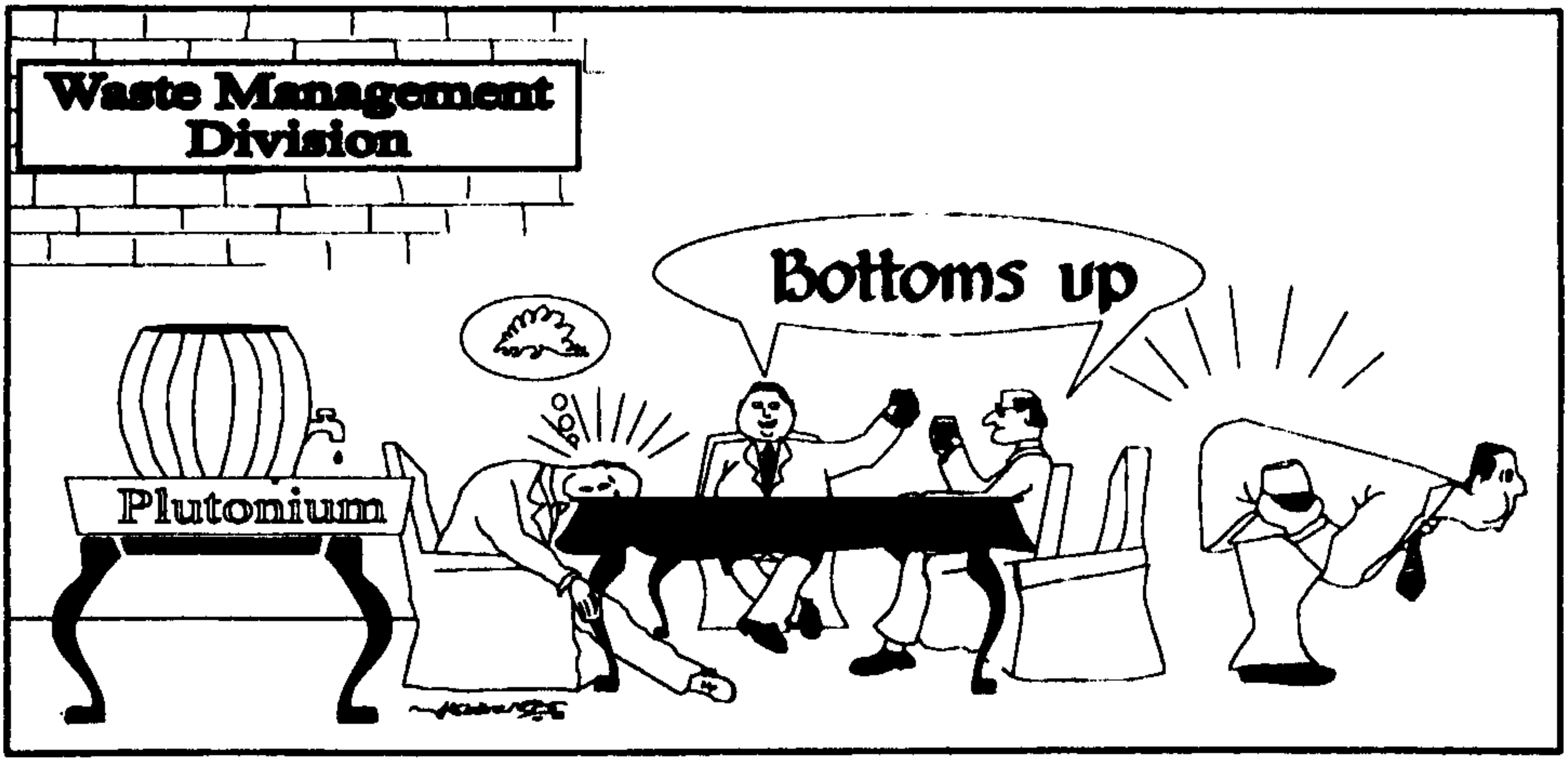
But plutonium would continue to pose a threat even in these hard-to-handle radioactive forms. The report notes that most fission products, which make spent fuel or radioactive glass logs difficult and expensive to handle, decay well before plutonium does. It therefore recommended research into a variety of transmutation options using critical and subcritical reactors that, in the very long-term, could fission essentially all existing plutonium. The NAS panel recommended this approach a supplement to, and not a substitute for, the two main options.

None of these disposal options can be accomplished quickly it will be well into the next century before they are completed. As Wolfgang Panofsky, Chair of the NAS plutonium panel, told the *Washington Post*, "the world is condemned to having to baby-sit this material for at least another decade," (January 25, 1994). As part of that atomic baby-sitting exercise, the NAS report recommends, all inventories of fissile materials must be declared, and put into international or bilateral verified storage.

One possibility for relatively quick processing of plutonium (within the next decade) is to vitrify it alone, without mixing it with radioactive waste. Because plutonium emits mainly alpha radiation, which is dangerous only when inside the body, it can be vitrified without massive shielding. A far more complex plant would be needed if radioactive wastes emitting far more penetrating radiation were mixed in.

The NAS report considered such an option, but did not recommend it, since the plutonium could be recovered after processing at far lower levels of effort than with spent fuel from reactors, a disadvantage from the point of view of potential re-use in weapons.

However, the report does note that "experience with separating materials from glass is far less widely disseminated than experience with spent fuel reprocessing." For this reason, this measure would provide a considerable barrier to re-use. Moreover, as with deep boreholes, a potential for re-extraction could be an advantage in the near future.



Who Says Plutonium Disposal Is a Problem!

Given the collapse of the economy in the former Soviet Union and the accompanying political and military instability, time is the most important factor in coping with excess plutonium. Added to the problem is the Russian government's attachment to plutonium as a resource. The NAS report should have put the vitrification of plutonium alone at least on a par with disposal in deep boreholes* We recommend that DOE build a pilot plant to test the process with plutonium metal and with various chemical residues present in the DOE complex. This would provide much of the environmental, health, and safety data needed for a sound decision on the vitrification of plutonium.

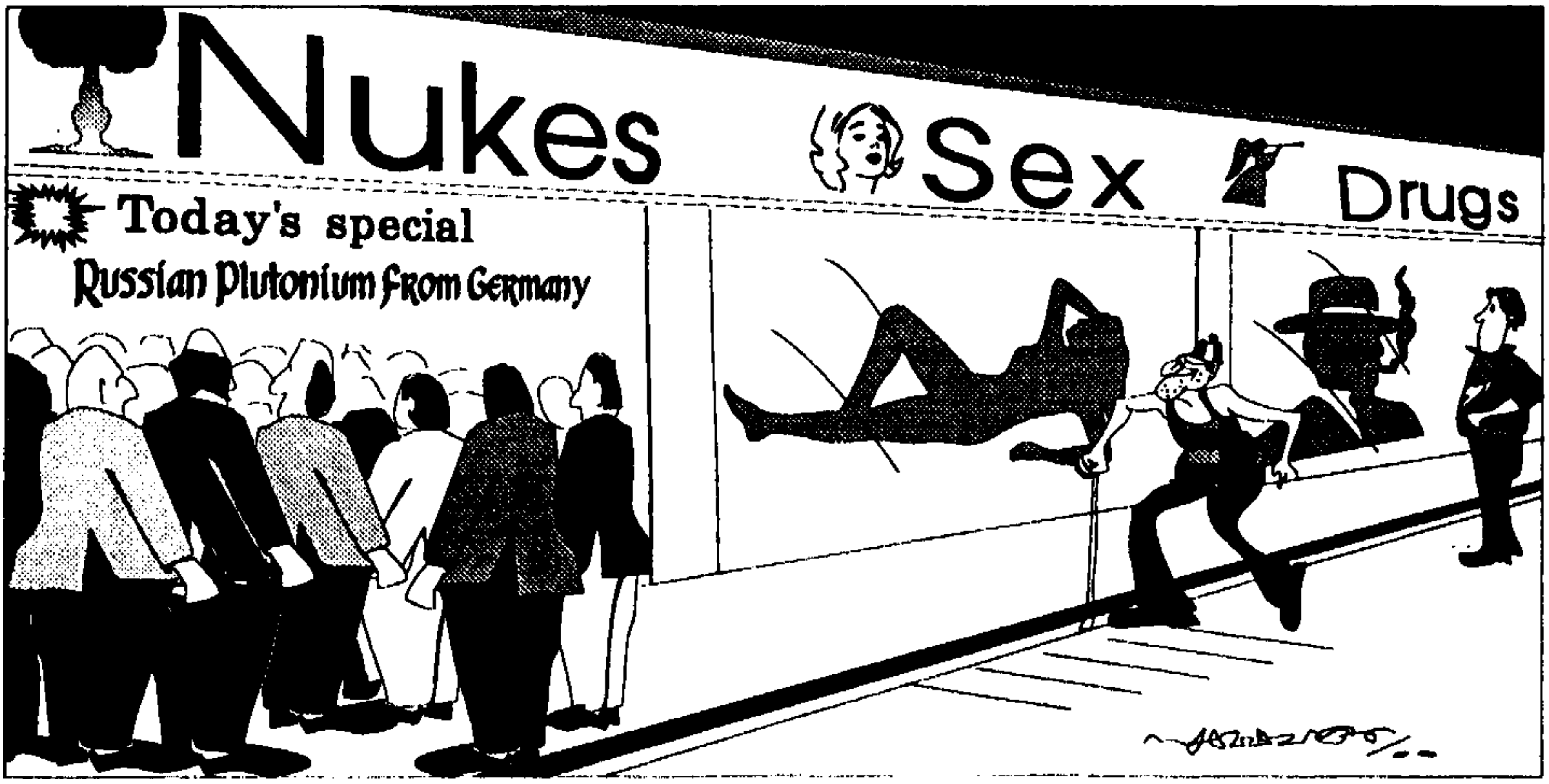
The high cost of deriving energy from plutonium has to do with the enormous precautions that must be taken in processing it (it is highly carcinogenic), with the large capital investment needed for building nuclear reactors, and with the difficulty and expense of decommissioning reactors and disposing of their radioactive wastes. Other burdens stem from safeguarding it, since all grades of plutonium are usable for making nuclear weapons, another important fact that the NAS report highlights.

The Twist In The Tall

All statements from high US officials need to be carefully considered for their Tiidden' agenda. Lest we forget, these are the guys who gave us "Atoms for Peace" in the first place. The continued funding for research on the Advanced Liquid Metal Reactor which is a breeder reactor with a new name and a so-called 'inherently' safe garb does little to generate confidence that the Americans are really serious about getting rid of their own plutonium stocks.

Plutonium was regarded in most of the post-World-War-11 era as the gold of a glorious nuclear age to come. It was not to be. Rather, it has become a terrible liability. Today, knowledge of nuclear weapons technology is so widespread that getting access to it is not a substantial barrier to proliferation, rather, as the NAS report notes, "access to fissile material is the principal technical barrier to proliferation in today's world..." That is why complete elimination of nuclear weapons usable materials is a necessary condition for achieving both nuclear non-proliferation and nuclear disarmament goals.

Based on articles by Matthew L. Wald & Michael R. Gordon in Times of India, Arjun Makhijani Science for Democratic Action Vol. 3 No.2 Special Thanks to Dr Egghead Science for Democratic Action Vol. 3 No.2 for the feature It Pays to Increase Your Jargon Power



The Global Supermarket

lethal Privatisation Off Nuclear Trade

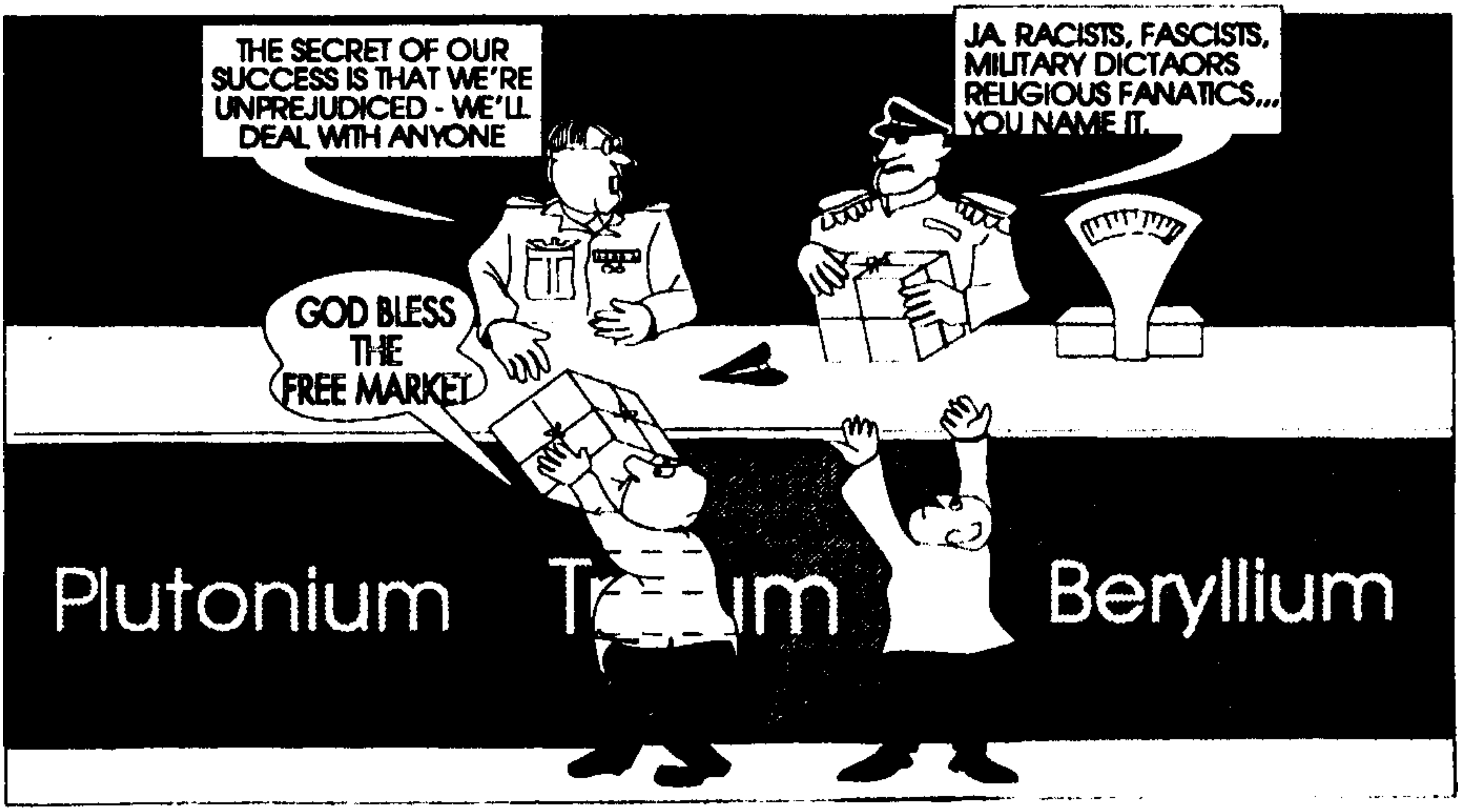
A Pakistani national is suspected by the German authorities to be involved in the smuggling of plutonium out of Russia. Indian newspapers and parliamentarians think this proves that the Pakistan government is building up a clandestine nuclear arsenal, and have expressed outrage. Long articles have been written about Pakistan's record of nuclear smuggling or theft.

I fear this loud condemnation of Islamabad may be misplaced, and that we may be ignoring an indefinitely bigger danger. We do not have the full picture yet, but for all we know the smuggled plutonium may have been paid for not by the Pakistan government but by terrorist groups in Pakistan. For all we know, the plutonium may have been destined for Dawood Ibrahim, or for Islamic groups wanting to overthrow the Rabbani government in Afghanistan, or wanting India to give up Kashmir.

For many reasons, I find it infinitely more frightening to contemplate plutonium with terrorists than with the Pakistan government. First, the Pakistan government already has nuclear weapons, and adding a few kilos to its arsenal makes little difference. Second, Pakistan can be deterred from using its arsenal by India's own nuclear power.

But if plutonium ends up with terrorist groups, they will constitute a new source of danger, over and above anything we face from Pakistan. More serious, it is impossible to deter a terrorist group with our own nuclear weapons. We can target our nuclear weapons at Pakistani military bases, but have no way of targeting individuals or groups. Finally, terrorist are far more fanatical and impervious to persuasion or international pressure than governments, and so will be far more reckless in their use of nuclear materials than Islamabad.

So I hope and pray that the plutonium being smuggled out of Russia is indeed going to the Pakistan government, and not to terrorist or underworld groups. I find it quite comic that supposed intellectuals are indignant at the prospect of the Pakistan government adding a few irrelevant kilos to its arsenal. Smuggling fissile material out of the ex-soviet Union is rife, and I would be extremely happy if the entire amount is purchase by the Pakistan government, for that will ensure that the material does not end up in the


THE SECRET OF OUR SUCCESS IS THAT WE'RE UNPREJUDICED - WE'LL DEAL WITH ANYONE
JA. RACISTS, FASCISTS, MILITARY DICTAORS RELIGIOUS FANATICS... YOU NAME IT.
GOD BLESS THE FREE MARKET
Plutonium
Beryllium

Come One Come All

hands of terrorists. Indeed, I would almost be willing to offer Pakistan a subsidy for the purpose.

Some people argue that the Pakistan government may pass on nuclear materials to terrorists. No nuclear government has ever done so, and I doubt if Pakistan will, since it is vulnerable to economic and diplomatic sanctions by western powers. (Editor's Note: I agree with the author's conclusion that it is doubtful that Pakistan will pass on nuclear material to terrorists, though not with his reasons for coming to this conclusion. It is not the vulnerability to western economic sanctions that makes governments take the straight and narrow path but sheer self-interest: terrorism is a two edged sword and can very easily bite the hand that feeds it. India has enough first hand experience of this with LTTE in Sri Lanka.)

It is not difficult for any skilled group to assemble a bomb once it acquires bomb-grade uranium or plutonium. A crude terrorist bomb weighs no more than one tonne, and be detonated by remote control. It will be small enough to be concealed and carried in a small truck or jeep to any site.

The thought is frightening, the Bombay blasts of March 1993 used RDX as explosives. If plutonium leaks to terrorists, the next blasts may be nuclear. Every time there is a communal riot, we could see nuclear blasts as the culmination of the frenzy, a new horror to add to other horrors. In a worst-case scenario, the acquisition of nuclear material by Muslim terrorists could be followed by a similar acquisition by Hindu fundamentalist groups, and that would be the end of the Indian state as we know it. This is, of course, an extreme scenario, but looking at the worst possible outcome is an important way of analysing the dangers of a situation.

Fissile materials need not be exploded to cause damage. Plutonium is extremely toxic, and even microscopic quantities can maim and kill people. A few kilos of plutonium would not be enough to make a bomb, but would be enough to poison the water supply of Bombay or Delhi, and maim or kill lakhs.

Why are leakages from Russia so widespread ? Because, as a nuclear weapons' power, it is not subject to international inspection. There is an urgent need to expand such inspection to cover all nuclear powers, including the USA. Leaks from US facilities are not entirely unknown. Even with universal inspection, some leakages will still take place. But the greater the vigilance, the smaller will be the leakages and the less the danger.

Left-wing comrades in India are terrified at the possible privatisation of government monopolies in industry. I am terrified by the possible de facto privatisation of nukes and violence. A civil society bestows a monopoly of force and weapons on its elected government, which alone can use weapons or force against individuals, in accordance with the laws of the land. This monopoly of force is sometimes misused. But it must not be replaced by free trade in violence and weapons, that way lies anarchy and oppression.

by Swaminathan S. Anklesaria Aiyar. The Sunday Times of India, August 21,1994.

The 40-year lie

On March 1,1954, at Bikini Atoll—a curving string of several dozen tiny islands looping gracefully around a 24 mile long lagoon—the United States tested its first deliverable hydrogen bomb. That test—Bravo—was the most destructive nuclear test in U.S. history. With an explosive force equal to nearly 1,000 Hiroshima-type bombs, it vaporised the test island and parts of two others and left a mile-wide crater in the lagoon floor.

In 1954, Bikini was one of the 29 atolls and five islands comprising the Marshall Islands, a United Nations trusteeship administered by the U.S. Department of the Interior. Although the total land area of the Marshalls is only about 70 square miles, they are scattered over 357,000 square miles of the Pacific. Two of the atolls—Bikini and Enewetak—were used for 66 nuclear tests, from 1946 to 1958.

The greatest irony of the Bravo shot was the decision not to evacuate any Marshallese. For Operation Crossroads, (a series of nuclear tests conducted on the same islands eight years earlier), the navy had evacuated the Marshallese living on Bikini as well as the three inhabited atolls closest to Bikini—Rongelap, Wotho and Enewetak. The tests during Operation Crossroads had not imperilled the other atolls, although they had seriously contaminated Bikini's lagoon.

Thus, in 1953, when the navy suggested an even more expansive danger zone for the Bravo shot and removing people from Rongelap, Interior Department officials balked. The 167 men, women and children removed from Bikini had never been permitted to return. Now High Commissioner Elbert D. Thomas, the highest ranking U.S. official in Micronesia, was reluctant to displace more Marshallese.

Their reaction to an enlargement of the area of activity will be apprehension, and fear that future externsions may place any of them in the same homeless position as the Bikini people now occupy," Thomas wrote his superiors at Interior. Evacuation would result in a "lowering of morale."

The Atomic Energy Commission agreed with Interior, and the results were tragic. For an atomic bomb the size of those dropped on Hiroshima and Nagasaki, the U.S. Navy had evacuated Marshallese for hundreds of miles to the east, west and south of Bikini. For a hydrogen bomb in 1954 that the government knew would be at least 400-500 times more powerful, no one was evacuated from these atolls. As a result, some 236 inhabitants of Rongelap and Utrik atolls, as well as 28 American servicemen on Rongerik Atoll and 23 crewmen on a Japanese fishing vessel, the Lucky Dragon, were sprinkled with fallout from Bravo.

Ever since March 1,1954, the U.S. government has explained that there was an unexpected "shift of the winds occurring after the detonation" that carried radioactive fallout from Bravo eastward over Bikini as well as over Rongelap, Utrik and other atolls in the Marshall Islands.

We now know that this was not true. The shot was deliberately set off despite the fact that government officiate knew exactly which way the winds were headed. According to a series of now-declassified for-the-record memos, the weather briefing at 7 a.m. February 28, the day before the shot, predicted "no significant fallout ... for populated Marshall Islands." But later in the day, "the **trend was toward an unfavourable or marginal condition." By 6 p.m., "conditions were getting less favourable."**

"It should be noted that no test is done without a specific purpose in mind, and at no time was the testing out of control."

Admiral Lewis Strauss at 'Bravo' press conference 30th March, 1954

The midnight briefing, less than seven hours before the shot, showed "less favourable winds at 10,000- to 25,000-feet levels." Winds at 20,000 feet "were headed for Rongelap to the east" and "it was recognised that both Bikini and Eneman Islands (east of the shot island) would probably be contaminated."

Following the midnight briefing, Bikinis weather outlook was downgraded to unfavourable, and Joint Task Force Seven ordered several of its ships to move 20 miles farther out to sea and to the south, to get out of the path of the fallout.

This evidence puts Bravo in a different category from an "unexpected wind shift." Some of the Americans were moved out of harm's way. But the "native" were left in place downwind. If the weather forecast created enough risk to move the ships, either the Marshallese in danger should have been also moved or the shot should have been postponed.

Following the shot, Atomic Energy Commission chairman, Lewis Strauss immediately opted for total secrecy, saying that "no public release will be made in regard to Call-out or evacuation in Trust Territory unless forced by leak or other circumstances."

Los Alamos test division leader Alvin Graves strongly objected to this policy. In an "Eyes Only" cable to the task force director of military application, Graves said he was "very concerned" about Strauses order. "I should regret very much the impression that we are being furtive in our actions with regard to these people." To no one's surprise Strauss prevailed.

Graves was right. The secrecy about the fallout exposure—and the later lies about a "wind shift"—were unconscionable acts, it is time for the U.S. government to apologise.

Jonathan M. Weisgall
Bulletin of Atomic Scientists
May/June 1994

The inhabited atolls of Rongelap and Utrik, some 100 and 300 miles east of Bikini were bathed in radioactive fallout. A pale powder coated Rongelap to the depth of one and half inches and Utrik was wrapped in radioactive mist. It was three days before U.S. Navy ships arrived to evacuate the residents. By then they were experiencing a range of symptoms: nausea, burnt skin, diarrhoea, headaches, eye pains, numbness and general fatigue. They also suffered a lowering of the blood cell levels, especially the white and T-cells, which form a major part of the body's immune system. Their fingernails came off, their fingers were bleeding and their hair was falling out. The exact dose of radiation that the 236 islanders received was never measured, but it is estimated at 11 rem per person on Utrik and 190 rem on Rongelap. (For comparison, the average dose per person received after the Chernobyl accident to residents living nearby was estimated to be 12 rems.)

"Greater knowledge of radiation effects on human beings is badly needed ... Even though the radioactive contamination of Rongelap Island is considered perfectly safe for human habitation, the levels of activity are higher than those found in other inhabited locations in the world. The habitation of these people on the island will afford most valuable ecological radiation data on human beingss."

The Rongelapese now suffer from high rates of malignancies and reproductive problems, all directly associated with radioactive fallout. The Marshall Islanders have one of the highest rates of diabetes in the world. They are also suffering from psychological phobias as the result of uncertainties about their future.

The Brookhaven scientists allowed the Rongelapese, including some who had not been exposed to the effects of Bravo originally, back to their islands in July 1957, declaring the atoll to be safe, despite 'slight lingering radiation'. There had been no radiological clean-up.

From Greenpeace Book of the Nuclear Age

The Economy off Nuclear Security

Stuck in a relationship of conflict, that has led in the past to three wars, security issues loom large for the governments of India and Pakistan. Being poor countries they want "cheap security", and now many of their policy makers seem to think that nuclear weapons can provide just that. But nuclear weapons have never provided cheap security and cannot do so for India or Pakistan. Nuclear weapons systems are neither cheap to develop, nor do they allow large reductions in conventional military forces.

Since both governments already claim to have some kind of "nuclear capability", it could be argued that the huge sums involved in developing such weapons have been spent already, so what is the point of crying over it now? Nuclear weapons are more than just "things" , like one buys from a shop. They are part of the search for "nuclear security". The setting up of a nuclear weapon's programme marks the beginning of this process, not its end.

The pursuit of "nuclear security" creates a sense of "insecurity" in others, which they try to overcome. A simple example of this is the rationale offered for Pakistan's nuclear weapons programme. It is supposed to be a response to India's nuclear programme, which was claimed, in turn, to be a response to the Chinese programme. The competitive dimension is common to all attempts to create security by military means, nuclear and non-nuclear. It follows from the strategic notion of "deterrence" which is not peculiar to nuclear strategies, but has been associated with weapons throughout history; in fact from the time the first caveman with his stone-axe decided if his neighbour also had a stone-axe, he needed a spear and in time a bow and arrow, guns, tanks nuclear bombs. This process is driven by pressures that are brought into being as soon as the first step is taken.

The logic of deterrence says a nation always has to be prepared to fight. There is, therefore, a great deal of importance attached to being ready to fight a war, at any moment. Deterrence theorists argue this "readiness" defers the outbreak of war. But they fail to understand this "readiness" not only undermines any effort to prevent crises from developing in the first place, it also becomes increasingly costly.

A former chairman of Pakistan's Atomic Energy Commission has already observed "all weapons systems, including nuclear devices, lose their effectiveness over time. New technological advances render them obsolete." This implied, to him, that "defence preparedness has to be rene wed and upgraded year after year." However, the open-ended and unlimited renewal and improvement of "defence preparedness" is certain to claim scarce resources "year after year". An apt analogy is heroin addiction; the victim spends more and more time, effort, and of course money "chasing the dragon".

How severe nuclear addiction can be is evident from the experience of nuclear junkies that have already travelled this road. The US started with two atomic bombs, which destroyed the two Japanese cities of Hiroshima and Nagasaki in 1946. In 1947 they wanted three bombs to use on Soviet cities, by 1949 they wanted 220, and by 1960 they had 18,000 nuclear weapons in their arsenal.

The types of nuclear weapons also increased, ranging from bombs that weighed less than 50 kg to those weighing several tonnes. The destructive power available increased enormously when, following the Soviet nuclear test-explosion in 1949, the US detonated the first hydrogen bomb in 1952- a feat which the Soviets duplicated within a few years.

The delivery systems for nuclear weapons increased not only in number but in their range and in sophistication. There are long-range bomber aircraft, nuclear artillery shells, short range intermediate range and intercontinental ballistic missiles, that can be launched from silos on land or from submarines, and now cruise missiles that can be launched from aircraft, shops and even from a truck. What has increased throughout is the speed, complexity and lethality of the weapons system taken as a whole.

Should anyone want to argue that this is a specifically superpower experience, they will firstly have to explain why Britain, France and China did not stop their weapons programmes when they had built atomic bombs. All these nuclear weapon states went on to build hydrogen bombs, missiles, submarines, and so on. There are signs that the next stage of competitive escalation has already begun in South Asia; it is widely believed that Indian bomb-designers have been working on a hydrogen bomb, and there is probably a similar team somewhere in Pakistan, desperately trying to catch up. If Pakistan's military planners were ever foolish enough to explode an atomic bomb as a test (and as a demonstration) then India's would almost certainly respond with a nuclear-test aimed at developing their hydrogen bomb.

Given that India and Pakistan are developing missiles and trying to buy submarines, clearly they are not immune to the escalation that comes from the logic of "deterrence". Even the prime minister (Benazir Bhutto) has recognised this when she referred to "fears" of an "arms race" and "huge defence establishments". Why she thinks these are still "fears", something that may happen rather than something that is already happening, is a question someone should ask her when it comes to preparing the defence budget. In her address to the National Defence College (March 17, 1994) she seems to return to the pattern of deterrence: "This is my promise to you: come what may we shall get the weapons of tomorrow. It shall not be our fate to live in perpetual fear of predatory neighbours brandishing hi-tech weapons."

All nuclear weapons, irrespective of who they belong to, once designed and assembled, have to be tested, inspected and maintained. For Pakistan or India to think about deploying their nuclear weapons, rather than just talking about them, or sitting on them without knowing if they are safe and reliable, makes such procedures absolutely indispensable. A nuclear test is more than setting off a bomb in a hole in the ground. It is actually a very complex scientific experiment, and doing an experiment just once is bad science. A typical series of nuclear weapons tests in the early days of the US nuclear programme consisted of 20 test explosions for each weapon design. These tests are not cheap; the current cost for one simple underground test explosion is $ 30 million. The US Department of Energy has requested $ 428 million for 1994, just to maintain the infrastructure and capability required for nuclear testing. But these are the least of the costs associated with nuclear weapons testing.

The real consequences of nuclear weapons testing are to be found in large areas of Nevada and Kazakhstan. These areas, described as "National Sacrifice Zones" by US officials have become unfit for human habitation as a result of these test-explosions. In both areas there is radiation in the soil, in the food and in the water. Farmers commonly find that their livestock give birth to "monstrous offspring", others just die "mysteriously". In Kazakhstan, milk in the area has 500 times the officially acceptable amount of radioactivity in it.

It is the local people who are the worst suffers. Around the Nevada test site, people now suffer from "cumulative cancers, neurological disorders, and genetic defects". Cancer is common that almost everyone living there can recall "long lists of tumours or deceased friends and relatives". Eyewitnesses have described people whose "hair was falling out and their skins seemed to be peeling off. And then there are the "jellyfish babies", born to women living in these areas; women who after six months of pregnancy, give birth to what "looked like a bunch of peeled grapes".

It does little good to detonate the test explosions underground. One

Nuclear weapons have never provided cheap security and cannot do so for India or Pakistan. The social costs of pursuing such "security" are evident in the schools, hospitals, roads, water and sewage systems that could have been built, but were not built. The money has obviously been there to be spent, but has, instead, been wasted on chasing the nuclear dragon, whose fire may consume both nations.

ANUMUKTI IS SEVEN

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out of every three underground Soviet tests threw radioactive dust and gas into the atmosphere. In about 30 tests these clouds were blown by the wind outside the test area into populated regions. The incidence of leukaemia has more than doubled in this area where more than 95 % of the children suffer from anaemia. The Soviet obsession with secrecy meant that "people living in this area died slow and horrible deaths from unknown illnesses—diagnosing radiation related illnesses was forbidden." As many as 500,000 people are believed to have been affected by radiation from the Soviet nuclear blasts in Kazakhstan.

The situation is little better in the US. An unpublished government report prepared during the 1970s estimated that 175,000 people had been poisoned with radioactivity, nearly everyone living within 250 miles of the Nevada test site. A further 250,000 US soldiers may have been exposed to radioactivity by US nuclear bomb tests, while as many as a million people have actually worked in the nuclear weapons plants. Ill-health among these workers is increasingly being linked to their jobs.

The intensely radioactive materials that form the core of nuclear weapons make the bomb-factories so contaminated that, in time, they become unusable. As a result of safety and environmental problems in such plants in the US does not have the capacity to make nuclear bombs. The cost of clean-up are staggering. It is estimated that to clean up just the Hanford nuclear facility in the US, described as the "dirtiest place on earth", will cost at least US $ 150 billion, the real costs may be much higher. What is already clear is that $ 8 Billion have already been spent on this with "little to show".

How badly do the people of Pakistan need "nuclear security"? How much are they willing or able to pay? The social costs of pursuing such "security" are evident to everyone, especially in the lost opportunities, the schools, hospitals roads, water and sewage systems that could have been built, the lives immeasurably improved, by deploying the same capital investment. This money has obviously been there to be spent, but has, instead, been wasted on chasing the nuclear dragon, whose fire may consume the nation. But it has to be said that nuclear weapons are only part of a larger story. There are the hundreds of thousands of men, hundreds of tanks, dozens of F-16s, submarines and frigates, as well as nuclear weapons and missiles. The larger story is about a society that is obsessed with war, that does not believe it can ever know peace.

Dr. Zia Mian
Sustainable Develop. Policy Inst. Islamabad.
The News March 19, 1994

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A Tale off Two Cities

Take two twinned European cities, Freiburg, on the edge of the Black Forest in south-west Germany, and Guildford in Surrey, England, both prosperous regional centres on the edge of fine countryside. Each has a medieval core, and expanding university, a cathedral, theatre, and castle. Heavy industry has hardly touched either city.

Guildford - how to put this kindly - throbs. Its city centre has been brutalised for twenty years by massive developments, and is a chaos for cars, one-way systems, and thunderous traffic. Pedestrians queue for minutes to be given nine seconds to cross the road. There are cyclists in Surrey but they have no human form in Guildford. The only "pedestrianised" street ia open to rush-hour traffic. Car culture rules.

Where Guildford hurries and bustles in its chaotic way, Freiburg purrs like a smug BMW. The perfectly preserved medieval city centre is spooky. Where are all the cars? One whole square kilometre of the city has been pedestrianised (this will be increased soon) and only orderly trams, bicyclists, and walkers glide over the cobbles. A vast open-air market offers a cornucopia of local produce. It is as packed as Guildford's many supermarkets.

To go from most British cities to Freiburg is to be shocked. You can walk all day around this city and talk and think quietly. You need never see or smell a car, or hear much more than cathedral bells. And Freiburg is twice Guildford's size.

Behind this superficial impression of the two cities lie two approaches to local government. As a local officer in Guildford points out, British cities are legally and financially constrained, confined to a narrow range of tasks allocated them by central government. Guildford cannot run its own buses or its own electricity company. It cannot ban heavy traffic, but it can commission traffic reports.

German cities can raise their own taxes, control their own utility companies, run their own transport networks. Ironically, it was the British occupation authorities after the war who allowed German cities these freedoms.

Freiburg was once an ordinary city of 200,000 inhabitants and really congested traffic. Then a few streets were made car-free. Some of the shopkeepers complained but most of them found that their trade increased, and soon people wanted to ban cars from still more streets. And so it started. Freiburg has since advanced step by step to becoming a model of environmental development, a city that is attracting study visits from practically all over the world.

German cities enjoy considerable autonomy. Freiburg has been able for instance to use its profits from the sale of energy and water to subsidise public transport by as much as 40 per cent. In 1966 it also allowed the municipal tram and railway company to reduce the price of season tickets by 30 per cent in order to provide an incentive for people to use such transport. A year later 23 per cent of the car users had gone over to travelling publicly and using an "environmental pass," valid for ninety tram, bus, and train lines run by 14 authorities. There was no loss of revenue.

In 1991 the pass was made applicable for all public transportation companies in the region - which meant for 2,600 kilometres of track -as well as German federal railway, and more people switched to public transport. Simultaneously with an extension of pedestrianisation, 400 kilometres of cycle paths were being laid parallel to 65 per cent of the city's roads. Now 26 per cent of all journeys are made by public transport, and 27 per cent by bicycle. It is hoped, too, that private car travel will fall to 33 per cent.

Stiff parking charges, reduced parking spaces, a 30 kph speed limit in the suburbs, and traffic calming on the edge of all residential areas, combined with further investment in the tramway system, have over the past fifteen years cut down car traffic within the city boundaries by almost 20 per cent, as well as reducing accidents by 25 per cent.

Frieburg has done more than deal with traffic. Time-variable charges have helped reduce electricity consumption, and a new heat-and-power scheme, scheduled for completion in 1996, is expected to reduce emissions of carbon dioxide by 20,000 tonnes. Frieburg seems well on its way to fulfilling its aim of becoming the most attractive city in Europe. It has in fact become so popular that it is already having to build a suburb for 10,000 people - naturally an environmentally advanced one, too.

John Vidal in The Guardian
taken from a condensation in
Acid News.

From The

Beating the Retreat

I remember in my childhood being taken nearly every year without fail to witness "beating the retreat'. There, we would all be seated on durries in front of the Central Secretariat with V.LP.s seated on chairs at our backs and army bands marching in front. Jawaharlal Nehru would be there and if he had time, he would be playing with us children in 'our' enclosure. And then as the Sun went down behind the towers and ramparts of Luyten's Delhi, the buglers and the drummers would play and the flags would be lowered. The inheritors of British India had inherited not only the raj but the trappings of the raj as well.

The technocrats who adorn the corridors of power in Delhi today probably have no use for such ceremonies to commemorate real events. They prefer to be businesslike and use press briefings. But the drums and bugles which sound the retreat have an unmistakable sound and that sound is discernible even in the dry surroundings of a press note. It is a sweet sound.

Dainik Navjyoti—a Hindi daily from Kota, carried the confirmation:

"The Central Government has given up the idea of building a nuclear complex at Rawatbhata. In addition to the two "working" reactors and two under construction, four units of 500 MW each was planned at the site.

"A spokesperson of the PM's Office, Mr. Bhuvanesh Chaturvedi, told the UNI that Units 3 and 4 of 235 MW each, are expected to be completed one year before the scheduled dated. But the Centre will refuse clearance for Units 5 to 8. Nuclear Power Corporation had asked for permission from the concerned central ministries for its plans to construct four units of 500 MW each.

Is Anumukti and the dream for a non-nuclear India round the corner? Unfortunately no. This is a strategic retreat. Not a change of heart. The reasons which have prompted the power brokers of Delhi to go slower down the path of atomic doom have to do more with inefficiency and unreliability of the atomic enterprise. They are sick of the fact that despite huge infusions of money and talent, nuclear facilities in the country have remained 'sick' units with brand new plants like Kakrapar and Narora having a worse production record in the last two years than twenty-five year old plants like Tarapur. But the disillusionment with the nuclear dream is not with the vision itself. A revival of nuclear fortunes in India is certainly possible especially if foreign nuclear manufacturing firms make a concerted bid in a changed political climate. The task for antinuclear groups is to educate the public regarding nuclear reality, so that the price of any revival becomes unacceptably high for any domestic or foreign dream merchant.

Some Impressions of Surat During the Plague

Surat is the fastest growing city in India. Diamonds and textiles are the two pillars of its prosperity. Out of a population of 2.2 million a majority are outsiders. Half a million from Orissa alone and a larger number from Saurashtra, with substantial contribution from Maharashtra, Rajasthan, Andhra Pradesh, Madhya Pradesh and Uttar Pradesh. The old Surtis have prospered and spread all over, from Bombay and Ahmedabad to New Jersey and California. Since the growth of Surat is a very recent phenomena, most of the old town residents retain small town character: everybody knows everybody else, people are helpful and share each others joys and sorrows.

The demolition of the Babari Masjid in Ayodhya led to a prolonged bout of communal violence in Surat. Many ran away and the industry in Surat took months to recover from that shock. But even that disaster pales in comparison with what has happened this year. In July, three lakh people especially from Saurashtra left because some tantrie said that the Ukai dam on the river Tapti would collapse on the seventh day of the seventh month at seven O'clock. Transporters made windfall profits with seats which normally cost Rs. 100 selling for four times the amount. While those who stayed were still laughing at the gullibility of those who left, it seemed that the tantrik would have the last laugh with floods in the river and the Ukai dam tethering on the edge. Although a number of areas of the city were under water, nobody left Surat on account of floods. Those effected moved to higher ground and were helped by voluntary and government efforts. And then within just 15 days, there was (is) the plague. On hindsight the first indications were reports of stray deaths of unknown causes.

Dead Body Found Near Chowk Bazaar State Bank

Surat 20th September, 1994

An unknown young male was found dead at 5.30 P.M. from the footpath in front of the State Bank of India in Chowk Bazaar. It is worth recalling here another dead body of a young man with blood on the face was found near the octroi checkpoint on Palanpur Road. Although more than 48 hours have passed since that happened, the Rander police have yet not been able to identify the victim. However, the new discovery of another bleeding body of a youth have stirred the Athwa Lines police.

Blood was dripping from the nose and mouth of the dead man. P.S.I. Mr. Veerpur examined the body. According to police sources Rupees 1745 was found from the pocket of the youth. A diary belonging to Mukesh Vinubhai was also found. There was a prescription issued by Dr. Manubhai M, Vaghasia of Jai Bhavani Society, Varacha Road.

Dr. Vaghasia on being contacted said that on 18.9.'94, a vegetable vendor who gave his name as Jagdish Dharma had come to his clinic. He had a cold and cough and was suffering from a little fever. After taking medicine this person had not returned for a second visit. The police confirmed that the prescription found in the youths pocket was in the name of Jagdish.

There is a tattoo of the 'love' sign on the chest of the dead man. The police are still in two minds regarding the name of the youth. The body has been sent to New Civil Hospital for post mortem examination.

New Gujarat Times 21.9.1994

Lone Ranger Rides Again

We (Sanghamitra and I) decided to go to Surat on the spur of the moment. There had been number of phone calk from friends here and abroad, worried about our safety and we had reassured them that Vedchhi was far away from Surat. Shri Narendra Zhaveri, a prominent Sarvodaya activist had phoned and asked for three hundred volunteers to undertake cleaning activity in Surat. Sanghamitra had tried to organise this team but the dread of the word 'plague' was such that less than ten people volunteered. But then the collector of Surat had saved us from the embarrassment of having to admit to our inability to help by prohibiting outsiders from coming.

The Center for Disease Control in Atlanta and World Health Organisation together have developed a computer programme called EPI-INFO 6 for analysis of epidemiological data. We had used a previous version of this programme for analysing the Rawatbhata survey data. During the plague crisis, our mail was badly disrupted. But, as luck would have it, we got mail just one day and in it was the new version of the programme. I took it as an omen.

Sanghamitra was reading aloud a strong editorial in Gujarat Mitra which condemned the attitude of doctors who had run away during the crises. Suddenly I felt that we ought to go ourselves and see what help we could render. The rains have made the Vedchhi - Surat road an ideal track for all who wish to take up cross-country motorcycle rallying as a profession, Though not part of this fraternity, we took off on our motorcycle so that we could have extra mobility in case of need in Surat.

The ride was adventurous to say the least. Potholes were large enough for elephants to disappear without trace. But what made the ride most memorable, was the site of masked men on motorcycles. They revived long forgotten images of the 'Wild West' I had formed in childhood by assiduous reading of illustrated comics. But it wasn't all just a kerchief around one's face. Far from it. Plague has led to a flowering of a whole range of fashion in masks. The artistic creativity and the innate business sense of Surtis has found combined expression in mask design. Politicians both local and national, who have come in plenty to get themselves photographed have favoured the sombre 'medical' mask while bureaucrats have preferred a multicoloured contraption which looks as if there was an old microphone taped permanently to their mouth in which they can bark orders. Some have gone in for the 'atomic' look—a mask with a long snout like one seen in advertisement pictures of nuclear workers working in contaminated environments while others have preferred the space walkers helmet. As we were nearing Surat, a car crossed us with all the windows drawn shut and four occupants all wearing blue coloured velvet masks. Even while running away with one's tail firmly tucked in, the jet-set does it in style.

Rumours Galore

We went to Narendrabhai Zhaveri's house. Friends in Bombay had sent a huge stock of tetracycline packed in large bags and the whole family was engaged in making small packets containing 40 tablets each so that they could be distributed easily. They had already been to the worst affected area—the slums around Ved Road—and had talked to residents, identified suspected patients and persuaded them to go to the civil hospital, and distributed drugs to the relatives who needed to both go to the hospital and take care of the family at home.

Everyone we met in Surat was eager to talk about the night it all began. 'The telephone was ringing the whole night." There was a rumour that the water supply had been poisoned and everybody was telling friends and relatives not to drink the water from the municipal supply. Dr, Minoobhai Parabia had the funniest experience. At three O'clock in the morning he was awakened by the phone which turned out to be a wrong number. But the caller hadn't hung up. 'The water is poisoned. Don't drink it." "But I and also my children have been drinking the water from the tap during the night and nothing has happened to any one of us.""Never mind, just listen to what I say. DON'T DRINK THE WATER."

Their Finest Hour

The South Gujarat Chamber of Commerce had set up a control room which would gather the latest information regarding hospital admission figures, deaths etc. and help disseminate this to the public. Manned entirely by enthusiastic volunteers, it provided a fine example of what voluntary effort can achieve in contrast to the fear stricken immobility of official bodies. Quite often, Nikunjbhai Desai and Nikhil Madrasi, the control room volunteers had to deal with unexpected situations.

A woman's voice: "Hello is that the control centre? Could you please tell me how many patients from Udhana have died since yesterday.?"
'Well, nobody from Udhana in today's list, Till now a total of 42 people have died. Mostly they are from Ved Road and Katargam areas. A total of 436 patients have been admitted till now but I don't have an area-wise break-up for those."
"I live in this society building and I am all alone. Everybody else from our society has run away. I am feeling afraid. What will happen to me?"

'There is a dead pig lying on the street in front of our house. How to getridofitr
"Why don't you try burning it. Just pour a bit of petrol or kerosene and light it. Once it catches fire it would burn because it has a lot of fat in it."
"It is a pig. Who knows there might be a communal riot if one burns it. Can't you get some corporation guy to come and get rid of it."
Hold on a minute, I will try them on the other phone. Hello, is that the Solid Waste Management Department? There is a dead pig at...
"What can I do if there is a dead pig? There is nobody here."
"Well, the first thing you can do is to note down the address. And the next thing would be to send somebody down there whenever available. Now tell me when can your person go there?"
"Hello, are you still there? A person will come around 10.30 tomorrow morning for the pig."
'Tomorrow morning ! Man it is a dead pig and it is stinking. Can't you do something right now?"
No, I can't do anything better from here. But you can do something. Burn it."

The Best of Times The Worst of Times

Estimates vary of the number of people who migrated out from Surat during the scare. Some say 3 lakhs, others 8 lakhs. Doctors were universally condemned for their lack of 'courage'. However, amongst this group of deserters were a lot of quacks who masquerade as doctors. But it wasn't only the doctors who made a bee-line out of Surat. Government officials were no lees fleet-footed. The District Information Centre is a fully computerised set-up meant to provide up-to-the-minute data. We went there to get census information regarding Surat, that would help us in our statistical analysis regarding the spread of the disease. The door was open and lights and fan were on and on a desk by the side of the wall were a set of computers, but there was nobody in. We waited for a few minutes for somebody to turn up and then went to an adjoining office, where one person was working. 'Dh, nobody has come to that office for the last three days. The officer, Mr Chavda, is from Saurashtra and has probably gone there. Come next week or may be the one after that and you might get what you seek."

Those who did not give way to panic and stayed were usually, full of good cheer and extremely helpful. We wanted access to a computer with a three and a half inch floppy drive. Within an hour, we had a choice of four computers in different parts of the city and Mr Gelani a computer shop owner drove miles at ten O'clock in the night to get us the required floppy drive. But getting a room where one could work undisturbed was a bigger problem. Dr, Girish Shah, whom we just met at the control centre, solved the matter by calling his friends at Arun Printing Press. "Dr. Gadekar has come to help us organise the plague data. You will not only allow him to use the computer but the telephone as well and also feed him." But Kalpeshbhai at the press went far further. "Anything you want printed, just tell me. The press is closed at the moment because my workers are absconding but for you I will operate it myself. I offered the District Commissioner to print any amount of plague related material free of cost on my own paper, but those guys don't want any 'outside' help."

An Attitude off Distrust

The establishment distrust of voluntary efforts was palpable. A number of private doctors told us that, "We have offered the civil medical authorities any help they want, but the answer is always the same. No, thank you. We dont want you here. We are quite capable of taking care of this problem ourselves." Even efforts by organisations such as the Jaycees to send food for junior doctors and nursing staff who had been put on eight-hour-on eight-hour-off shift, were rebuffed.

There were only three persons who reported for work in the Preventive and Social Medicine Department. Dr. Vikasben Desai was one of them. "If you want we can give you a copy of "the EPI-INFO programme. We can also help with the data entry." "Research is not done by getting emotional. Let this thing die down and then there will be plenty of time for doing research. I have ordered a computer. But it needs copper wiring. This 3 metre portion has not been wired still. And now, with the plague, I don't know when the person who does the wiring will come."

Rule Britannia

Any suspected case of plague was required to report to the New Civil Hospital. During the first few days after the scare, there was absolute anarchy A number of patients some of whom were seriously sick and many who were not, had simply absconded when transferred to the plague wards. The press had reported all this. However, by the time we went to Surat, order had supposedly been restored. There were hefty men in blue and brown camouflaged suits all over the place and the entry of journalists had been 'banned'. The first sight that greeted us at the hospital was that of a foreign photographer bent over her camera and these guards ordering patients seeking admission to stand in a group, so that she could get the 'shot' she wanted.

The Greatest Need

The most vulnerable group were the relatives of patients. They were not only looking after the patients but were also going back and forth between their homes and the hospital for cooking and taking care of the family there. Most of them had not been told at all of the risks they faced or what they ought and ought not to do. At the time we went, they had received just two tablets of tetracycline which they had not taken themselves but had given them to their young children at home in the hope that the medicine would produce immunity. Just talking with these people and listening to their woes was the first thing that we did. It was by doing this that we realised the need for doing a proper survey so that one could acquire a better understanding of the course and spread of the disease and its response to the various drugs being used.

The 'junior' doctors who were actually looking after the patients were enthusiastic about the survey and helped us prepare a questionnaire. Kalpeshbhai at the press got it printed in a jiffy and by the next day we had also assembled a team of volunteers who would talk individually to the relatives of the patients and fill out the questionnaire. That is when our problems began.

'Senior' doctors were unenthusiastic about the whole project, but nobody wanted to tell us to quit. Finally, we were directed to the head of the medicine department, Dr. Parmar. "I feel this work should be done but my hands are tied. From 12 O'clock today there will be military rule in the hospital and nobody would be allowed inside without the express permission of Shri Bhanujan—the plague commissioner of Surat."

Shri Bhanujan had been posted to Surat after the outbreak of the epidemic and had tried to streamline the administration and take precautionary measures which ought to have been taken much earlier. He was 'out' on rounds most of the day but we managed to locate him in the evening. His first reaction was negative. 'I cannot allow you to unnecessarily risk your lives by talking to patients." However, he was quick to grasp the importance of doing what we were trying to do. *"I* know the administration. As soon as the scare is over all the papers will be filed and the whole thing will be forgotten. No lessons will be learnt. OK I will talk to Dr. Mehta, the hospital superintendent and let him decide on the modalities of allowing you to talk with the relatives of the patients."

However, when we returned to the hospital, Dr. Parmar vehemently opposed the whole idea, with the result that finally Dr. Mehta said to us that the hospital would provide us with the addresses of discharged patients and we could conduct our survey in their homes. This was an ironically funny statement because in most cases, the hospital had not bothered to collect the detailed address. Also it made no sense to study just the patients who had been 'cured'. Since there was no point in continuing with the exercise, we abandoned the whole project and returned to Vedchhi. We gave a copy of the programme to junior doctors and helped them computerise the woefully inadequate hospital records.

The last two months have been characterised by a controversy as to whether the infection was actually plague. The unscientific approach of the medical authorites and their total lack of concern regarding proper record keeping ensures that the controversy will continue.

Unpreparedness In Disaster Situations

Why have I devoted so much space in *Anumukti*—a journal presumably devoted to non-nuclear India to recollections about the plague? I feel that preparations for disaster management are non-existent in India and we are not learning any lessons from the disasters that are occurring with increasing frequency. The epidemic in Surat was an opportunity that could have been used to gain information which would have been useful in future disasters. Instead, it was used by many senior doctors merely as an opportunity to buy status-enhancing equipment like computers and intercom. It was a lucky thing that the infection was not very virulent and not many people died. God help us if we ever have a major nuclear accident.

Surendra Gadekar

How Come Tarapur Is Immune to Cracking?

As many as 10 US reactors have developed cracks in steel shrouds surrounding radioactive fuel, a problem the US Nuclear Regulatory Commission says could lead to a meltdown in case of an earthquake.

Cracks were first found last fall in a reactor in North Carolina, but industry officials expressed surprise at the number and the extent of the fractures found in recent inspections.

Seven US reactors have cracks and three showed indications of cracking, according to Boiling Water Reactors' Owners Group, a group of utilities that use the reactors. The Group also found indications of cracking at two reactors in Europe and China.

The cracks could point to problems in other reactor components and could lead to a meltdown if they shifted during an accident or natural disaster, such as an earthquake, and jammed control rods used to shutdown a reactor, NRC warned.

Anti-nuclear groups say a manor disaster could happen at any time, but the NRC and utilities contend that the public is in no immediate danger. "Are they safety problems? Yes, but not of any imminent nature," said Mr. Jan Strasma, an NRC spokesman. "It is difficult to project some force that could cause movement of the shroud." The shrouds are two-inch thick stainless steel cylinders that direct the flow of radioactive water around the fuel core.

Of the 108 working reactors in the US, 37 are of the boiling water type developed by General Electric in the late 1960s.

The two reactors at Tarapur, are the same General Electric made boiling-water reactors. In fact, in the words of an ex-chairman of the Department of Atomic Energy, "they are the oldest functioning reactors of their vintage'. DAE officials have categorically said that similar cracks have not been detected in the Tarapur reactors. The question that arises is the following: Is the absence of detection due to the fact that there are no cracks or is it due to faults in the detection process itself? According to the chairman of the Atomic Energy Regulatory Board, Dr. A. Gopalakrishnan, the cameras used for monitoring the surface of the shroud at Tarapur are not able to 'see' over 95% of the area of the shroud.

Rawatbhata Reactors Cause Worry

Atomic Energy of Canada Ltd. says it is worried that two Candu reactors at Rawatbhata could suffer serious accidents, but the agency's hands are ties because of a 20-year stand-off in nuclear relations between Ottawa and New Delhi.

In a letter to International Atomic Energy Agency in Vienna, AECL's president of the Candu division, Donald Lawson, said the reactors could suffer a loss of coolant accident, the same type of problem that beset the Three Mile Island reactor in March 1979 in the US.

Pressure tubes at the Indian reactors, according to data provided by Indian scientists, appear to be suffering from a condition known as liydride blisters," which could lead to a rupture and massive leaks of heavy water coolant. 'The condition in these reactors are such that there is a real potential for a pressure tube rupture to occur at any time," Lawson wrote.

The Candu reactor at Pickering in Ontario, Canada suffered such a burst in 1983 and was shut down for repairs that cost several hundred million dollars. Rawatbhata-1 has had the worst performance of all Candus and both the reactors have been rife with problems including reported radiation leaks. Canadian expertise was withdrawn from India since 1974, following India's explosion of a nuclear device.

India has expanded its nuclear programme by building clones of Candus. AECL spokesman Mac Keillor said Canadian experts would like to offer more assistance to India, but they are prevented by doing so because of the ban imposed by Ottawa on such aid unless India signs the NPT. The Indian government has denied any problems exist at the reactors, he said.

WISE News Communique 419

The State Electricity Boards Do Their Bit to Keep India Healthy

The Nuclear Power Corporation (NPC), the sole supplier of atomic power to state electricity boards (SEB) all over India, would have been richer by over Rs. 513 crores if the SEBs had all paid their dues on time. As it happens, they haven't for the past several years, bringing the total outstanding to Rs. 513.03 crores till April 30 this year, against a total power sales of Rs. 477.44 crores in 1992-93. (The figures for this year are not yet available.)

Confirming this, Mihir Mitra, director Environment and Public Awareness of NPC said tha.t while most state? were behind in their payments, the largest single defaulter was Rajasthan State Electricity Board with unpaid bills of Rs. 198.62 crores, though the state plays host to the Rajasthan Atomic Power Station.

Maharashtra too owes NPC a modest Rs 6.26 crores for electricity supplied partly by Tarapur Atomic Power Station and partly by Kakrapar Atomic Power Station. Mr Mitra said that some of the northern, states appeared most reluctant to pay their dues, because of which the worst sufferer is Narora Atomic Power Station with outstanding dues of Rs 286.14 crores. It supplies eight states including Uttar Pradesh, Punjab, Haryana, Himachal Pradesh and Jammu & Kashmir.

To make matters worse, the NPC as a whole is generating only half the amount of electricity it is capable of. According to an internal memo, all the NPC units put together are producing only 860 megawatts, though they have a capacity of 1620 megawatts.

NPC sources said this was because several major generating units are not working. Thus, NAPS-1 and KAPS-1 each having a capacity of 220 megawatts, have been shut down. The Narora unit has been inoperative for the past 15 months ever since a fire broke out in March 1993, while KAPS-1 is shut down for its annual maintenance needs. Also, unit-1 of RAPS of 200 megawatts capacity had to be closed down two months ago because of repeated leakage of heavy water from the overpressure release device which is supposed to prevent a dangerous build up of pressure inside the reactor vessel. Though there was no leakage of radioactivity from the unit, the Atomic Energy Regulatory Board (AERB) ordered it closed.

"Even if we were to restart it now, the AERB would allow us to operate it at 50 percent capacity. It may not be economically viable for us," Mitra said.

Sumit Ghoshal Indian Express
June 29,1994

Protest at Watts Bar

In 1925 in a small courtroom in rural Tennessee, USA, a teacher named John Scopes went on trial for the crime of teaching the theory evolution in school. Local and state authorities felt that teaching of evolution was an insult to the biblical account of creation.

Now nearly seventy years after the event, the same courtroom is again in the news with the biocentriste meeting the nuclear 'creator'.

The only nuclear plant still under construction in the US, the Watts Bar reactor in Eastern Tennessee has been under construction for the last 22 years. Those years have been pockmarked with delays, huge cost overruns, safety problems, and controversy. The Tennessee Valley Authority (TVA), owner of the plant now claims it will be operation sometime next year.

Not far from Watts Bar, in the Cherokee National Forest, Earth First's week long annual meeting, the Round River Rendezvous, was held in early July. Several hours before dawn on July 11, about 150 Earth First! campers travelled to Spring City, Tennessee, equipped with 35-feet long poles and six concrete-filled 55-gallon barrels, to erect a blockade in the main thoroughfare into the nuclear plant before 4,000 workers arrived. The crew raised the poles into a tripod putting a sitter 25 feet up in the middle of the four lane road, flanked by three barrels on each side. Blockaders plunged their arms elbow deep into a tube running through the middle of the barrels and lacked their arms to a center point.

It was a classic blockade, and one that had the TVA security and local police scratching their heads when they arrived. For a few hours demonstrators danced, sang drummed and talked to the media. As dawn broke with a light rain, a 14-mile traffic jam snaked down the road.

Immediately after informing demonstrators they could leave the site and avoid arrest, police charged the crowd and began making random arrests. When the dust settled, 54 people had been arrested for trespass, including a legal observer who had express permission to be present, musicians, and photographers, as well as the blockade group. When supporters followed those arrested to the town of Dayton, the entire group was threatened with arrest for "inciting a riot" unless they left town immediately. Four activists were arrested as they approached the jail seeking information. A cop told an activist who asked about her civil rights, 'You left your civil rights at the county line." Welcome to Tennessee.

Most of those arrested were released within 48 hours, on $ 1,000 bail each. Fifteen persons did not post bail and were held eight days until the first preliminary hearing on July 19. After four hours of trying to make a case against the group, the prosecutor offered a plea bargain of $ 25 fine for no contest pleas. 30 people accepted the deal while 24 others pleaded not guilty and they will face trial in December.

All those who participated in the action feel that it was a target well chosen. The plant is not yet licensed or loaded with fuel, and the action a classic non-violent blockade has put Watts Bar on the map at a crucial time.

Contact; Ka titah Earth First!
P. O. Box 281, Chattanooga, TN
37401 U.S.A.

"Well Within Internationally Accepted Levels"

Tritium is a radioactive form of hydrogen. It has both a natural origin as well as a man-made origin. Naturally occuring tritium is regularly formed in the upper atmosphere because of cosmic rays. In that case, the level in underground water is about 0.1 Bq/1.

Atmospheric nuclear tests from 1945 onwards have released large quantities of tritium in the atmosphere . The concentration of tritium in underground water due to this source is found to be between 1 to 5 Bq/1.

Besides tritium is created as an unwanted by-product in heavy water reactors. It is released to air and water during normal reactor operations, and can be detected in the local environment around nuclear facilities at levels above what would otherwise be found.

The present "allowable" level of tritium in drinking water in Canada is 40,000 becquerels (Bq) per litre. An expert committee appointed by the Minister for Environment and

Energy Mr Bud Wild man, has recommended that this level be immediately reduced 400 times to 100 Bq/litre and efforts be made to achieve a target of 20 Bq / litre within five years.

Drinking water contaminated with tritium levels greater than 20 Bq/1 is common in communities downstream from the Chalk River Nuclear Laboratories on the Ottawa River, and downstream from Pickering and Bruce Nuclear Power Stations. The 100 Bq/1 level is often exceeded when accidents involving spills of heavy water occur at these nuclear facilities. In August 1992, a spill at Pickering resulted in tritium levels in Ajax area drinking water peaking at over 1,300 Bq/1.

The Advisory Committee on Environmental Standards (ACES) was given the task of reviewing the drinking water standard for Ontario, This happened because of concerns about a plan to build a new water supply facility in Ajax, a few kilometres downstream of the Pickering Nuclear Generating Station. Many local residents and groups requested a full environmental assessment of this facility because of concerns about water quality and other outstanding issues.

The ACES report has clearly described the double standard that is being applied to radioactive contaminants, compared to other toxic materials. Most contaminants have standards set that are based on a lifetime of exposure, whereas radioactive pollutants have had exposure standards calculated based on one year of exposure. The standards branch of the Ministry of Environment and Energy prepared a proposal for revising the drinking water standard to 7,000 Bq/1, but failed to recognise the double standard. ACES took the 7,000 level and divided by 70 years, the average lifetime, to arrive at the 100 Bq/1 proposal.

ACES has also acknowledged that tritium is more hazardous than is presently accepted, and has proposed that the allowable level in drinking water be reduced to 20 Bq/1 in five years.

Tritium Contamination of Water Near French Military Installation

The military nuclear complex at Marcoule in South of France is authorized to discharge significant quantities of tritium in the river Rhone and in the atmosphere. The yearly quantities are 2,500 billion becquerels in liquid form and 10,000 billion becquerels in gas form.

An independent French nuclear monitoring laboratory CRII-RAD has analysed 22 samples of underground water in the Rhone Valley to determine the level of contamination by tritium due to the discharges of Marcoule. Analysis were also made in a nearby valley Durance. The nuclear research center of Cadarache is located in this valley. In absence of any contamination from nuclear installation, underground water can contain a few becquerels of tritium per litre.

In the Durance's valley the levels of tritium found in underground water are between 1.9 and 2.4 Bq/1 downstream of Cadarache center, compared to 2.2 Bq/1 upstream. The impact of Cadarache discharges are thus not detectable.

However, in the Rhone Valley, the analysis clearly show contamination by discharges from Marcoule. Samples were taken from 17 places from the center up to about 100 km down the river. The contamination is significant near the center where several samples show more than 50 Bq/1 with a maximum of 288 Bq/1. All samples show levels of contamination well above those from the nuclear tests origins, except a deep forage (450 m below ground) which shows less than 1.2 Bq/1. For the samples from farther down, contamination could also come from other industries and hospitals.

Cogema, the state-owned French company that operates Marcoule says that the discharges are much below the levels authorized by the law. The pollution is thus legal!

A lot of questions are still unanswered. Who gives the authorization ? How are the 'acceptable' levels of discharges decided ? How are the risks associated with these discharges evaluated ? How are the doses calculated ? Was specific attention is given to the risks for children?

As Marcoule is a military installation all the information are classified. Therefore all the files related to those questions are not accessible.

Most contaminants have standards set that are based on a lifetime of exposure, whereas radioactive pollutants have had exposure standards calculated based on one year of exposure.

The experts' committee has also acknowledged that tritium is more hazardous than is presently accepted.

What About Us ?

The mainstay of the Indian nuclear programme is the CANDU reactor which produces much larger amounts of tritium than other reactor types. Thus tritium contamination is a severe threat to the health of the people living in the vicinity of Indian nuclear installations. Below we present two tables from official sources which detail the tritium contamination near Raj as than Atomic Power Station at Rawatbhata.

The Central Water Commission has also made measurements of tritium concentration in water samples from different locations around RAPS. Their data is given below.

Tritium Activity of liquid Effluent Released to the Aquatic Environment

Year	Daily Average in billion becquerrels/day	Concentration at Discharge Point bequerrela / litre
1986	42.55	**93**
1987	13.70	38
1988	78.44	**106**
1989	64.38	**91**
1990	64.75	**48**

Source: I.S.Bhat, MA.Iyengar, R.P.Garg, S.Krishnamony and K.C.Pillay "Environmental Impact of PHWR type power stations — Indian Experience" Conference Proceedings on Small and Medium Scale Nuclear Reactors Delhi 1991

Annual Mean Tritium Concentration in RAPS Water Samples

Year	1981	1982	1983	1984	1985	1986	1987	1988	1989
Sampling Locations									
Up to 1 km from RAPS									
Discharge Canal	220	417	160	80	100	50	90	140	170
RAPS Jetty	325	437	141	110	250	60	110	70	130
Heavy Water Plant Nala	—	912	398	740	210	140	180	130	**220**
Reactor Coolant Forebay	110	70	100	60	60	30	40	20	—
From 1 to 5 km from RAPS									
Rana Pratap Sagar Dam Bhabha Nagar	90	148	80	70	50	50	60	30	**40**
Rana Pratap Sagar Dam Vikram Nagar	105	158	100	80	50	50	50	40	**40**
Saddle Dam	115	148	76	50	70	50	40	40	**40**
From 6 to 15 km from RAPS									
Barkheda	BDL	130	BDL	BDL	BDL	**BDL**	BDL	BDL	**BDL**

Source: Central Water Commission Conference Data 1989

BDL: Below Detectable Levels

The first thing one notices on seeing these two tables is the fact that they do not correlate with each other. Thus, for instance, while the amount of tritium released to water in 1987 was three times less than that in 1986 according to DAE sources, the Central Water Commission finds the amount of tritium in the water at different locations to be greater in 1987 ! The credibility of the government is called into question because of such discrepancies in data collected by different government agencies.

Barkheda is upstream of the plant and thus the finding that tritium was below detectable levels there is not a surprise. The data does not tell the detectable level of the instrument used for detection. What is a surprise is the reading of 130 bequerrels/litre at Barkheda in 1982. Since readings from other samples are also higher for that year, there might have been a large accidental and unannounced release of radioactivity Most of the other readings especially in 1 to 5 kilometre region, which incidentally is inhabited by large number of people who use this, water for drinking and other domestic uses, show that levels of tritium have been hovering around 100 becquerrels per litre. This is the limit that the Canadian experts[1] committee has recommended for drinking water in Ontario and five times the limit that they feel needs to be adopted in five years. The claim of Indian nucleocrats that radiological contamination in India is "well within internationally accepted limits" thus refers to situations where the 'international limit' itself is outdated and not an acceptable guardian of public heath.

It is also worth noting that the present contamination is caused by the operation of only two reactors while construction of further two reactors has been proceeding apace at Rawatbhata. When these reactors begin operating, the radioactive contamination of the area would be much larger. If the people of Rawatbhata are not to be further sacrificed on the alter of 'development', there is thus an urgent need for the government to rethink its plans.

Surendra Gadekar

Their True Colours

Antinuclear activists have often been accused of being "anti-national foreign-funded agents". Once in Rawatbhata, I was accosted by a journalist who told me that "RAPS authorities have said that you have received a lot of CIA money for starting an agitation over here." I replied that the only way he could find out for sure would be to visit us in Vedchhi and live with us for some length of time and see if our lifestyle was that of people with a lot of available slush funds. However, my eyes fell on a headline in a newspaper he was carrying which said that Dr. P. K. Iyengar—the then chairman of the Department of Atomic Energy was at the time in Paris negotiating for the supply of two nuclear reactors of French design. I pointed out to this journalist the anomaly of accusing antinukes of being foreign agents while the nuclear establishment was doing its damnedest to procure foreign investment. However, even in my most uncharitable moments I never thought that people in the nuclear establishment were anti-national. Conceited, smug and arrogant, certainly; technology and 'development'deluded megalomaniacs, probably; but anti-national, no.

> *Indians were brainwashed for almost a hundred years about the virtues of self-reliance and Swarajya, hence it would take some time to change their thinking."*
>
> *Dr. M. R. Srinivasan*

A recent report in Times of India of September 20, 1994 by Vidyadhar Date, has shaken my belief. Mr. Date has interviewed Dr. M. R Srinivasan who headed the Department of Atomic Energy in its 'glasnost' phase and who is even now acting as a publicist for nuclear energy and writing extensively in newspapers and popular magazines. I have quoted Dr. Srinivasan's very words (see box) and I will let the reader form her/his own judgement on the nationalist credentials of such globalising developmentists. Since Dr. Srinivasan has been such a strong promoter of the French and German nuclear programmes, we present below extracts from two articles which appeared in the Bulletin of Atomic Scientists and the New Scientist. They present a picture quite contrary to Dr. Srinivasan's eulogy.

The French Mess Nucleaire

The last few years have not been kind to French nuclear projects. The French civilian power industry owes bondholders billions of francs and is increasingly regarded as unreliable. The major producers of nuclear waste in France are the French Atomic Energy Commission's (C.E.A.)and Cogema, one of its many subsidiaries. C.E.A. operates five ostensibly civilian research centres. Its Division of Military Applications (DAM) runs six military research and production centres. The public image of the French nuclear establishment has been badly spoilt following several mishaps. A few years ago, nuclear waste turned up in Paris sewers. A severe drought forced power cutbacks because the rivers into which the reactors discharged hot water fell dangerously low. A severe winter had the same effect, since water froze in the lakes. Thus the much touted nuclear electricity was unavailable in times of greatest need. In March, a technician who was engaged in cleaning up at Cadarache was killed in an explosion (Nature April 7,1994). Cadarache has been built on a well-known fault line that has experienced 40 tremors since December. No one knows if the reactor could survive a major quake (New Scientist May 21, 1994). C.E.A. has also been criticised for spending more than $ 1 billion a year on 'development' when no new plants are in the offing.

Many Accidents Little Information

Although accidents have been legion, the public has been told of few of them—and almost never hears about their impact. A brief reference to a plutonium fire in a meeting of the DAM's Central Committee of Hygiene and Security illustrates the degree of concealment. 'The most serious accident that we have had in metropolitan France was a plutonium fire in building G,"according to a December 1968 meeting of the committee. This accident presumably contaminated at least a portion of a building and possibly spread plutonium outdoors. Despite assiduous searching the authors of the article have not been able to find any other reference to this accident. The only building that they were able to identify as *"G"* is a plutonium handling facility at Bruyeres-le-Chatel, only 37 kilometres from Paris.

> *"In France villagers are taken into confidence before projects are launched and the benefits of the projects are passed on to the local people. Nuclear power projects were being efficiently run by the state."*
>
> *Dr. M. R. Srinivasan*

Mixed-oxide fuel containing both uranium and plutonium is produced at Cadarache. In 1974, the plutonium technology workshop received a batch of fuel rods that had been briefly irradiated in the Phenix breeder reactor. The plutonium workshop was to recover the fissile material from the rods containing plutonium and uranium oxides. The uranium workshop was to process the rods that contained uranium oxide enriched to 27 percent. Unknowingly, two uranium rods were treated at the plutonium workshop, and one rod containing plutonium went to the uranium facility. The switch came to light only at the end of 1976, when the uranium workshop cut apart its share of the rods and experienced "completely abnormal" contamination problems. Each of the Phenix rods had been labelled with a small identification number, but otherwise they were indistinguishable. The CEA kept the incident a secret.

One accident that couldn't be entirely concealed was the release of seven tonnes of uranium hexafluoride at the Comurhex facility at the Pierrelatte uranium enrichment site. A visible cloud of hydrofluoric acid drifted beyond the site's boundaries. The accident, one of many chemical spills at Pierrelatte, occurred July 1, 1977.

Disposal by Dilution

Any report of French expertise in waste disposal should be taken with a grain of salt—no independent body is monitoring waste disposal activities. The clean-up measures that the industry is known to be taking—diluting the waste and minimising the amount of waste—are suspect.

The Air Above

The earth's atmosphere has been considered a prime waste-bin by French nucleocrats. Reprocessing of spent fuel to recover plutonium at the Marcoule production site released many radioactive pollutants such as carbon 14, rare gases, tritium, and iodine. Marcoule Tritium Workshop, which removes tritium from irradiated targets and DAM's Valduc Centre, which assembles the fissile and thermonuclear components of weapons, have each emitted significant quantities of tritium. The Valdue Radiation Protection Service even burned tritiated waste in the open air at a farm on its property from 1968 to 1975. In 1979, when the centre stored solid tritiated wastes, tritium releases from the operations were of the order of 290,000 curies per year. For comparison, the Rajasthan Atomic Power Station released a mere 70,000 curies in 1990.

The Waters Around

The CEA has always taken advantage of rivers for the disposal of liquid waste. Fontenay-aux-Roses released waste through the sewer system into the Seine; Le Bouchet most likely employed the Essonne; and Marcoule, certainly the Rhone. CEA reports state that suspect effluents from Saclay went to a pond that had been created at the time of Louis XIV to collect water for the chateau of Versailles.

In the 1970s, the navy dumped radioactive liquid effluents from submarine reactors into the ocean off the ile d'Ouessant. Presumably, the effluents had been treated with resins on board the submarines. Workers called a special tank ship that did the dumping the "Minirem." Ocean dumping was the CEA's answer to solid as well as liquid waste. In 1960 the commission intended to dump 6,500 containers of radioactive sludge from Marcoule into the Mediterranean just 80 kilometres off shore. After protest, the CEA backed down and dumped only 20 containers for experimental purposes." In 1967 and 1969, however, the CEA got rid of an additional 46,000 containers from Marcoule by participating in two European Atomic Energy Agency dumping excursions in the Atlantic Ocean.

The Ground Below

Injecting liquids into the soil has been a temptation at sites not near substantial bodies of water. Between April 1958 and May 1959, Saclay injected-as an experimental,188 cubic metres of water contaminated with strontium, tritium and yttrium into the ground. The centre continued to experiment with injection in the mid-1960s, but whether it was adopted as a regular practice is not known. Valduc, which like Saclay is not near a river began evaporating its liquid effluents in 1971. How it disposed of its effluents between the late 1950s and 1971 is a mystery.

Disposal by Shrinkage

Prance has no permanent disposal site for highly radioactive or alpha contaminated waste. Much of the waste is currently stored where it was generated.

One way of decreasing the volume of waste is simply to put it into public domain. A CEA document reports, for instance, that several hundred tons of metal, some from Valduc that was slightly contaminated with tritium, and some from Marcoule that emitted 'slight' beta and gamma radiation, were "recycled" outside the nuclear industry in 1987.

Another major method of reducing the volume of waste is by applying heat to it. The CEA has operated incinerators off and on since 1963. It has also melted contaminated metal in a furnace at Saclay and Marcoule.

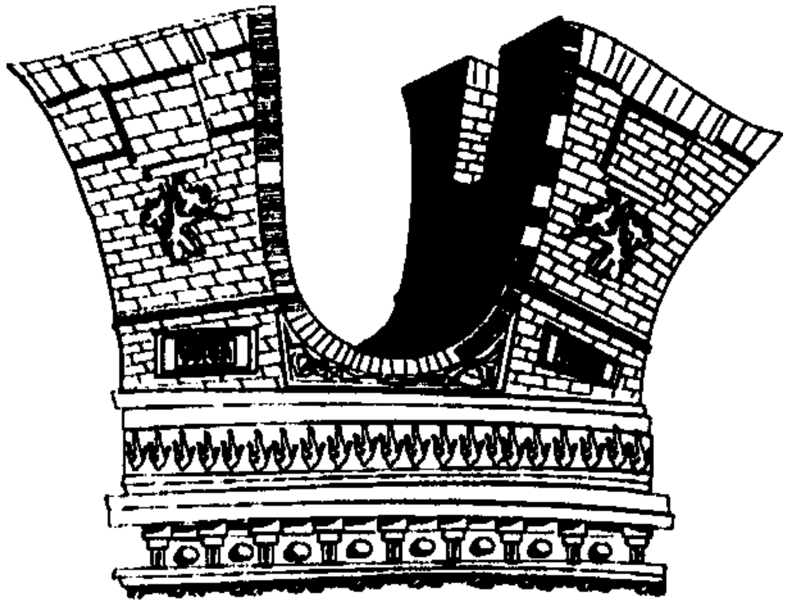
These methods share two major disadvantages. First, heating or otherwise melting radioactive substances volatalises caesium 137 and other radionuclides, which may then escape. Trapping them necessitates complex system of gas purification that are liable to break down if not scrupulously maintained. Incinerating waste produces secondary wastes that may themselves be difficult to handle. The CEA has not yet learned how to treat the ash from its reprocessing facility UP1 to remove enough of the plutonium to permit its final storage above ground.

The French have touted vitrification (or glassification) as the perfect means of preparing radioactive waste for storage. Actually, vitrification shares the major problems of heat treatment because fission products are calcined and then melted. Furthermore, the glass blocks produced at Marcoule are suspect. As of 1990, the French did not subject individual glass blocks to quality control, and hadn't sufficiently studied the corrosion-resistance of the glass blocks fabricated at Marcoule. Furthermore, the CEA's current plans for cleaning up Marcoule include the "repackaging of old glass logs" and 'the taking back of contaminated glass"stored underground.

Contaminated Groundwater

In siting nuclear centres, the CEA seems to have been drawn like a dowsing rod to places where water lies close to the surface. It has also favoured sites where the ground above the water is permeable. Documents available to us refer to the groundwater contamination at Pierrelatte, Valduc and Marcoule. But water under other sites, particularly those with underground storage of waste and permeable soil, may also have been contaminated.

At Pierrelatte in 1976, an incident in an installation which converted uranium tetrafluoride to uranium hexafluoride contaminated groundwater with uranium and fluorine. At Valduc, metal contaminated with tritium was stored in an old cistern into which water still flowed. As a result groundwater was contaminated with tritium.



L'Are de "Defeat

Taken from: David Macaulay; Great Moments in Architecture

Monument to the French Nuclear Programme

This incident may not have been the only source of contamination at Valduc. Despite an earlier formal complaint, a worker representative complained in 1981 hygiene committee meeting that about 800 containers of tritiated waste were 'still at the mercy of the weather, thus contaminating the groundwater."

Minutes of a 1975 meeting of the Marcoule hygiene committee refer to the fact that a leaky joint in the pipes in room 48 at the Marcoule Pilot Workshops had slightly contaminated the groundwater. Other accidents that may have contaminated groundwater include a 1970 leak in an old buried pipe that had received radioactive effluents from a metallurgy workshop. The leak seriously contaminated the ground with plutonium and perhaps with other nuclides.

That such incidents have had a lasting impact on groundwater is strongly suggested by a 1990 Cogema document revealing that Cogema had to build a 450-metre waterproof wall underground, to the south of the effluent treatment station, in order to prevent groundwater from flowing south. Behind the wall, Cogema pumps out two to three cubic metres of water per hour.

CEA and Cogema monitor the radioactivity of the water beneath and near their nuclear sites, according to Cogema and CEA reports. However, they don't make the results public. No independent body had examined the groundwater around the sites, although radioactivity released into the air, soil and water is likely to end up in the subterranean water.

The Super Failure of Superphenix

The C.E.A. is hoping that the money guzzling fast breeder, Superphenix can be turned into an asset. This one an only commercial scale fast-breeder reactor in the world has been plagued by a series of disasters ever since it began operations in 1986. The reactor which was completely shut down since 1990 has operated a total of only 174 days in eight years—a record which puts even Indian non-functioning reactors to shame. Its most persistent problem has been leaks in the cooling system. The liquid sodium coolant employed at Superphenix can be explosive when exposed to air.

With the global change in attitude about the value of plutonium, C.E.A. would like to see the Superphenix rise from the ashes as a plutonium burner rather than a breeder. The agency claims the reactor could dispose of 200 kilograms of plutonium a year if it can be made to operate reliably. The government admits that it has abandoned the idea that Superphenix will ever make money.

Calculating Real Costa

Moving towards privatisation, the government no longer guarantees nuclear industry bonds. The nuclear engineering company Framatome is to be privatised. The commission is also looking to other companies to take over other technologies.

An independent study, *'The Costs of Nuclear Power in Western Europe"* by the International Project for Sustainable Energy Paths, points out that the French emphasis on nuclear power has had other negative effects. According to the study, so much money was spent on nuclear power that France neglected to clean up its fossil fuel plants. The result? Its sulphur dioxide emissions are twice as high per kilowatt-hour as neighbouring Germany, which installed scrubbers. The study found that official estimates of operations and maintenance costs had been systematically underestimated. They had been estimated to rise at 1.5 to 2 percent per year while actual increases have been five to six percent. Overall, government nuclear costs have been underestimated by at least 60 percent. Taxpayers usually end up paying the difference. The study also decries the 'fluid boundaries" between civilian nuclear power and French nuclear weapons programmes: the close connection has allowed the government to keep extraordinary silence on aspects of both.

Based on two articles by Mary Byrd Davis and Linda Rothstien in the Bulletin of Atomic Scientists July/August 1994.

GERMan NuclEaR

On the banks of the river Elbe, in the wooded heart of northern Germany, stands a big yellow building. It is 189 metres long, 40 metres wide, 20 metres high and cost £ 32 million to construct. Around it stands a high security fence and a large earth rampart. For the last 11 years it has stood there, cavernous and empty.

The building has been nursed by nuclear companies, blockaded by antinuclear protesters and bitterly disputed by politicians on primetime television. The building, near the village of Gorleben, is an "interim store", meant to house spent fuel from Germany's nuclear power stations for at least the next forty years. It is also the likely destination for blocks of highly radioactive waste produced by the reprocessing of German spent fuel at Cap de Ia Hague in France and Sellafield in the UK

The interim storage has been licensed to receive up to 1500 tonnes of spent fuel since 1983, but none has yet arrived. The electricity companies are being prevented from opening the store by the local government of Lower Saxony—the state in which Gorleben is situated.

On 19th July 1994, spent fuel from Philippsburg Nuclear Power Plant was loaded into a cast-iron '"Castor" flask ready for shipment to Gorleben. But since then the flask has been sitting on a railway wagon under a blue awning outside the power station while thousands protests and the politicians argue.

The massive (up to six metres long) castor flasks are meant to be the main barrier against leakage of radioactivity into the environment during storage. The nuclear industry hopes that the castor would allow it to store radwaste for forty years. This is the first attempt at dry storage of high level waste for such a long period anywhere in the world and naturally the nuclear industry everywhere is very keen that it succeed.

The whole operation has encountered a number of technical problems while loading the flask at Philippsburg. The castor has to be shut airtight. However, the engineering inspector for the state government reported that one of the flask's two stainless steel lids was more than 10 millimetres wide and could only be made to fit after last minute improvisations. If the flask were to leak after arrival at Gorleben, it would have to be transported in the same leaky state back to Philippsburg since there are no remote-handling facilities for repair at Gorleben.

Demonstrators have built a small village of wooden huts named CASTORNIX near the entrance of the storage site. Streets have been painted, traffic signs struck over and holes have been dug under the streets leading to the storage site. On November 5, all large streets in Liichow-Dannesberg (the region of Lower Saxony where Gorleben is located) were occupied by demonstrators.

The antinuclear movement knows that if the first castor is stored at Gorleben, many would follow. The people of Liichow-Dannesberg are determined to fight against this assault on their lives and the lives of unborn generations of their children. Good luck to them. Are you listening Dr. M. R. Srinivasan?

Based on an article by Rob Edwards in New Scientist 8.10.94 and a news item in the WISE News Communique 422 18th November, 1994.

Florida Nuked Chicken to Iraq

Vindicator Inc. is the only company running a food irradiation facility in the US First it tried its hand at irradiating fruits and vegetables which were meant for distribution within US That did not work since nobody wanted to stock the stuff. Next, it was irradiated chicken. Still, no go. The company has been losing more than $ 100,000 a month for the last nine months.

According to an article in the Associated Press, Vindicator has teamed up with a company called US Harvest Technologies to ship "up to 25,000 tons of cobalt-irradiated chicken to Iraq." Are these nuked birds intended to finish the work started by US marines two years ago?

Safe Food New Winter 1993

Dr. Rosalie Bertell to visit lndla in December

Dr. Rosalie Bertell needs no introduction to antinuclear activists. Winner of the Right Livelihood Award and the much acclaimed author of No *Immediate Danger,* she has been a source of inspiration andlielp to many. She is to visit India in December. It is proposed to hold a one-day workshop for activists at Bombay on Wednesday, December 7,1994.. The venue of the workshop has not yet been decided but friends who want to attend should contact Shri R. Ashokr Kumar, at Bombay Sarvodaya Mandai, Gandhi Book House, Tardeo, Bombay. Telephone: 561-5916.

Besides Bombay, Rosalie also will be visiting Trivandrum (Dec. 8 -11); Bhopal (Dec. 12); Calcutta (Dec. 14 -18) and Delhi (Dec. 19). We have given her proposed itinerary in detail so that activists and in fect anybody interested in the nuclear issue can get in touch with her and take advantage of this opportunity.

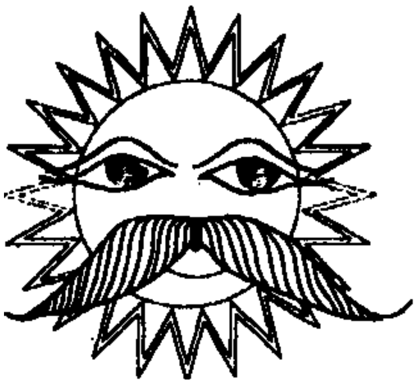
Letter (Box

Protest Against Kalga Nuclear Want

About 2,500 people had gathered in Karwar on 2nd October for our rally to protest against Kaiga nuclear power plant. 80 friends from Goa had also come to show solidarity. Even people form Sholapur area have now begun to seriously think about dangers of nuclear power. But even now, people are not yet confident that they can stop this plant with their own efforts. Once the elections to the state assemblies are over, we shall have to restart our programme to raise people's awareness and undertake 'padayatras'. We intend to have a meeting in Sirsi and formulate a decentralised programme from there.

You must come for this awareness programme. We were eagerly waiting for you at the meeting on 2nd October, but then we realised that plague in Surat would be a great obstacle in your coming. But as we saw in the meeting on 2nd October, there is a lot of enthusiasm amongst the people and if three or four people undertake some sustained work, I believe it would not be difficult to get many to oppose the construction of the Kaiga plant.

Dr Kusuma
Snehakunja, Kasarkod, Honnauar,
Uttara Kannada, Karnataka



The Only Sets Source of Nuclear Energy

Food Irradiation

Food and health are vital concerns. The very survival of people is at stake. Since the irradiation of food articles impinges upon these critical matters it is imperative upon the government to institute a massive information dissemination programme so that the consequences of this technology could become clear to every body and the choice of whether to accept or to reject this technology could be an informed one. Instead, the Government of India had decided to go ahead with its food irradiation programme with not even a hint of public debate. Even the queries of concerned citizens like me have elicited no reply from the concerned authorities. This dictatorial step by the so-called servants of the people must be opposed.

R. Ashok Kumar
Bombay Sarvodaya Mandal

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The Long Death

Radiation is like oppression
The average daily kind of subliminal toothache
you get almost used to, the stench
of chlorine in water, of smog in the wind

We comprehend the disaster of the moment,
the nursing home fire, the river in flood
pouring over the sandbag levee, the airplane
crash with fragments of burnt bodies
scattered amongst the hunks of twisted metal,
the grenade in the marketplace, the sinking ship.

But how to grasp a thing that does not
kill you today or tomorrow
but slowly firm the inside in twenty years.
How to feel that a corporate or governmental
choice means we bear twisted genes and our
grandchildren will be stillborn if our
children are very lucky.

Slow death cannot be photographed for the six
o'clock news. Its cdl statistical,
the gross national product or the prime
lending rate. Yet if our eyes saw
in the right spectrum, how it would shine,
lurid as magenta neon.

If we could smell radiation like seeping
gas, if we could sense it as heat, if we
could hear it as a low ominous roar
of the earth shifting, then we would not sit
and be poisoned while industry spokesmen
talk of acceptable millirems and .02
cancer per population thousand

We acquiesce at murder so long as it is slow,
murder from asbestos dust, from tobacco,
from lead in water, from sulphur in the air,
and fourteen years later statistics are printed
on the rise in leukaemia among children,
We never see their faces. They never stand,
those poisoned children together in a courtyard
and are gunned down by men in three-piece suits.

The shipyard workers who built nuclear
submarines, the soldiers who were marched
into Nevada desert to be tested by the
H-bomb, the people who work in power plants,

they die quietly yearn after in hospital
ward and not on the evening news.

The soft spring rain floats down and
the air
is perfumed with pine and earth.
Seedlings
drink it in, robins sop it in puddles,
you run in it and feel clean and strong,
the spring rain blowing from the
irradiated
cloud over the power plant.

Radiation is oppression, the daily
average
kind, the kind youre almost used to
and live with as the years abrade you,
high blood pressure, ulcers, cramps,
migraine,
a hacking cough;
you take it inside
and it becomes pain and you say, not
They are killing me,
but I am sick now.

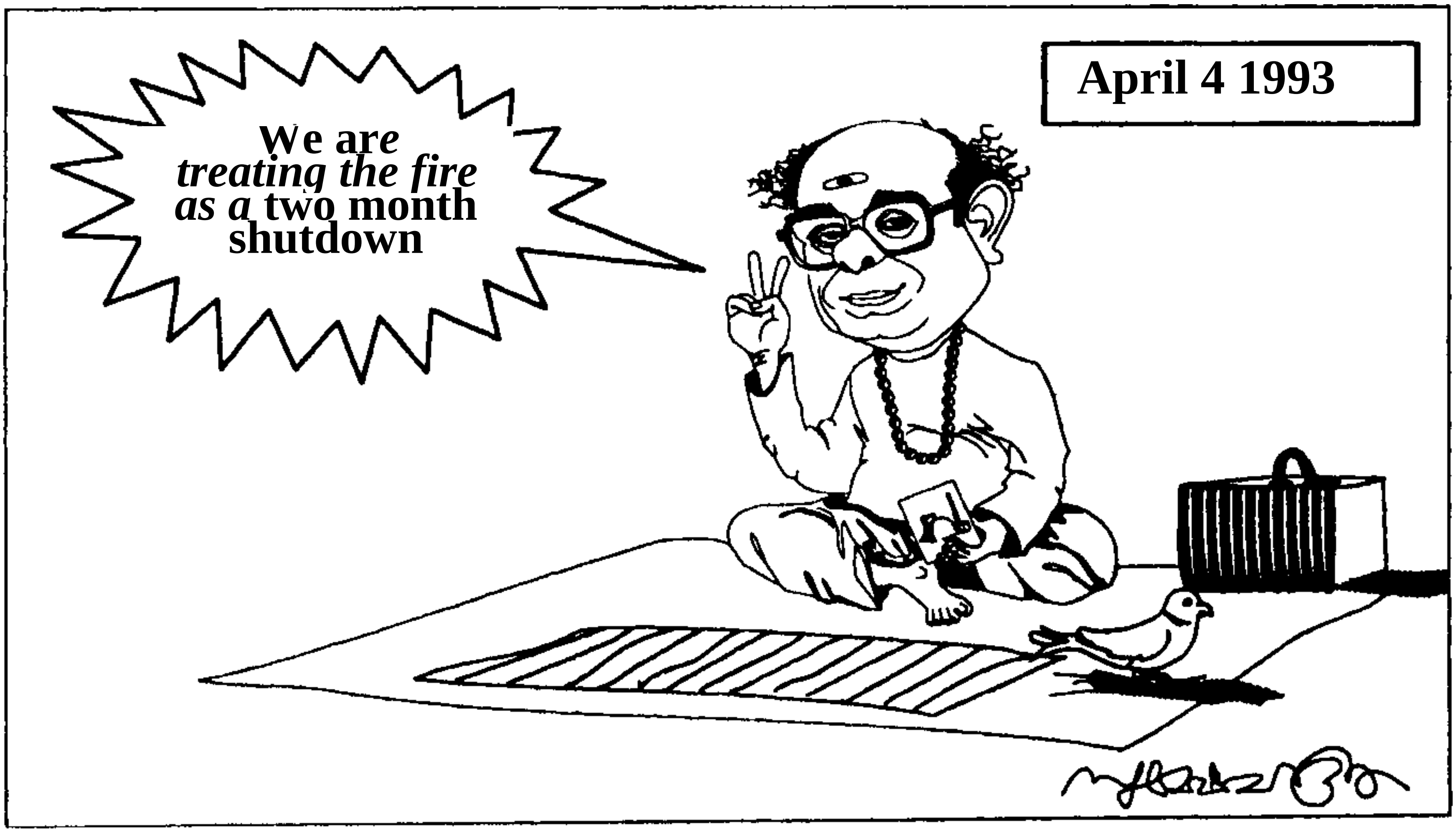
From Circles on the Water
by Marge Piercy

From The Editor's Desk

Scientists as Soothsayers

Supposedly scientists and engineers are people who speak precisely, at least regarding matters of their chosen speciality. If this is true, then one wonders how come nucleocrats are so often wrong in their predictions. One can understand blunders in long term prediction like the one Dr. Bhabha—the father of the Indian nuclear effort—made in 1962 when he said that in 26 years India would have 20,000 MW of nuclear electricity. (We just about reached 1,000 MW) There are various factors which can influence the final outcome and no one even the great Dr. Bhabha could have foreseen everything. But to make such large errors of judgement in short-term forecasts, such as weeks or even days like Dr. Chidambaram about Narora (See Cartoon Below) or the station superintendent of Kakrapar, Mr. Kalaiya, about Kakrapar-1 restart (On July 3rd, he felt that the unit would start by end of July, whereas it actually started end of October,) makes one wonder whether these blunders are actually errors or are they deliberate attempts to mislead the public and the government. Dr. Gopalakrishnan, the chair of the Atomic Energy Regulatory Board, suggests (see page 10) that these "optimistic assessments" may be the age-old approach to get initial financial approvals. But then, is this the scientific way or is it the way of frauds and cheats. The question the public needs to ponder is: Can we entrust our security and well-being to such error prone enthusiasts.

Despite Dr. Chidambaram's prediction Narora-1 takes 21 months to restart


April 4 1993
We are *treating the fire as a* two month shutdown

Paying the Price for Honesty and Courage

Mr. Manoj Mishra's ordeal

No regular reader of Anumukti would be unaware of the havoc created by floodwatera that entered Kakrapar Atomic Power Station on the night of 15th of June, 1994. As has been already described in previous two issues of Anumukti, floods caused large damage to the turbine room where more than two hundred pumps and motors were drowned. The waters also breached the waste containment and some bags containing radioactive waste were carried away and deposited far away from their original disposal site. Had the reactor been in operation at the time, the situation could have resulted in a serious disaster. But although mercifully no great disaster took place the event did highlight the lax attitude towards safety of the nuclear power plant authorities. Some of the glaring irregularities:

No scheduled flood plan exercises had ever been carried out at Kakrapar. The gates which controlled the water level in the reservoir adjacent to the plant had not been opened for years with the result that huge amount of grass had grown around them. Thus, when the water level started rising these gates could not be opened.

I The hydrology of the plant and Its surroundings have yet not been done though two nuclear reactors have already commenced operation.

The drainage points were not situated above the maximum flood level

The much touted "defence in depth" was found in practice to be full of holes. Major pumps which run the secondary cooling system of the reactor like the Boiler Feed Pump, the High Pressure and Low Pressure pumps were located below ground level and were drowned under the flood waters. But under the defence in depth concept, each of these had auxiliary pumps which should have taken over and continued uninterrupted operation. However, these auxiliary pumps were also located below ground level and were also drowned and hence having them made not the slightest addition to the safety of the plant. In fact had the water risen a little more, even the diesel pumps which provide emergency power to control the reactor would have been drowned and the reactor would have been left with no power at all.

The station authorities did not feel It incumbent upon them to inform the Atomic Energy Regulatory Board (AERB) promptly of the situation. This illustrates the contempt in which the board is held by officials of Nuclear Power Corporation. The fact that AERB is unable pull up these officials and take any strong action where these people are personally held responsible and have to pay a price that bites for their lapse, adds to the contempt.

All this shows a criminal negligence on part of designers, operators and regulators of nuclear power in the country. And yet nobody is likely to suffer any adverse consequences at all. Nobody except Shri Manoj Mishra—the man who blew the whistle.

Shri Manoj Mishra is a plant operator and has been active in the employees'union. He is the secretary of the INTUC lead union. When the plant was flooded on the 15th of June, the authorities were inclined to keep quiet about the whole incident. Even the Atomic Energy Regulatory Board was not informed by the plant authorities. However, Mishra talked to newspaper reporters and apprised them of the possible serious consequences. It was only after the news was published in Gujarat Samachar on the 23rd of June, that people outside and even the nuclear establishment in Bombay, took cognisance of the event. The station superintendent made a dash to Surat and issued a statement along with the district collector of Surat assuring all and sundry that all was well under control.

Mishra was immediately suspended from work for the crime of talking to the press and his suspension continues even today, five months after the event. While all those who displayed singular dereliction of duty continue merrily along, the one man who put the interest of the country above his own selfish interests has been made to suffer as an example to others that in the nuclear establishment the only leaks' that matter are leaks of authentic information.

The Going Rate

On August 6th, 1994, Shri Narayan Desai had written a letter to all the legislators of Gujarat assembly asking them to form an all party committee and investigate the damage caused by floods to the Kakrapar Atomic Power Station. Busy as all these worthies are with the welfare of the people only five of them found time to reply to his letter. However, the MLA from Kadi in Mehsana district of North Gujarat, Shri Nitin Kumar Ratilal Patel sent our letter to Kakrapar authorities for their comments. Five months later, on January 16th, 1995, we received a copy of the reply from the station superintendent of Kakrapar Atomic Power Project. We have reproduced parts of this letter elsewhere in this issue. While ending, the letter states, 'The welfare of the public is fully taken care of. Kakrapar Atomic Power Station has taken innumerable measures for the welfare of the people around the area as per Annexure." We are reproducing the annexure in full for two reasons. One, it is fine example of what nucleocrats believe to be 'development', And secondly, we do not want people around other nuclear installations to be unaware of the going rate for disease, deformity and death.

Nuclear Power Corporation
Kakrapar Atomic Power Project

Details of assistance rendered by Nuclear Power Corporation of India Ltd. to surrounding villages and areas of the Kakrapar Atomic Power Project.

L Land compensation

a) Original disbursement as per the award of Land Acquisition Officer Rs. 73,58,803.66

b) Additional compensation disbursed as per the Court's verdict is Rs. 99,54,049.50

c) Further additional compensation likely to be awarded as per compromise formula being arrived at is Rs. 2,50,00,000 /-

2 In addition to land compensation, 85 families were compensated for cost of houses.

3 Additional 40 families occupying houses in government land were also compensated as special case for houses.

4 Additionally building materials of houses were allowed to be taken away by the house owners and free transportation for shifting materials provided.

5 Rs. 12,57,000 /- deposited with State Government for rehabilitation of displaced families.

6 116 persons of land affected families directly recruited by KAPP

7 Land affected persons in large numbers were also employed in establishments of contractors.

8 Training imparted to land affected persons for getting selected to ministerial / clerical posts in KAPP.

9 Training and nourishment programme conducted for land affected persons to facilitate induction by Central Industrial Security Force.

10 Students belonging to land affected person's families and others in surrounding villages imparted English familiarisation classes.

11 Candidates belonging to land affected person's families are given preference for recruitment Only if suitable candidates from land affected families are not available, other means of recruitment Like through employment exchanges is resorted to.

12 Total number of locals directly recruited by KAPP are 657 and the number of land affected persons are 116.

13 Land affected persons are given preference in allotment of shops etc. in the residential township.

14 Efforts are on to help the villagers in forming Worker's Co-operative Society to undertake petty works and contracts connected with the Project.

15 Medical camps have been organised every year in association with voluntary organisations of the township. Large number of villagers availed the facility including the facility of eye-operation conducted during the medical camp. Free transportation and medicines are provided to the patients and also follow up facilities given.

16 Continuous measures are taken for creating awareness of the general public with regard to the project. As part of this, regular visits of villagers, children from schools, colleges, and other educational institutions are organised to the plant site. The visitors are provided with free transport and other facilities.

17 Rs. 2,68,000 /- was sanctioned by NPCIL to the Vyara Municipality for construction of roads in Vyara.

18 An amount of Rs. 2000/- is given to three village schools nearby every year towards the cost of study tours for the benefit of the students. The village school in Unchamala has been given infrastructure1 facilities, educational aids etc. and action is also on hand for giving financial assistance for construction of school extension building.

19 NPCIL has sanctioned financial assistance to the tune of Rs. 5,00,000 /- for the Mandvi Education Society.

20. Approval has already been obtained for financial assistance to the tune of Rs. 20,00,000/- for improving the existing roads between Moticher, Tarsada, Nanicher and Raj wad villages. Approval has also been obtained for extending financial assistance for construction of roads from two village hamlets located near the plant site boundary and linking them to the Vyara Mandvi road.

21 A Cricket pitch has been laid by NPCIL at Vyara for the promotion of the sport of Cricket.

22 Action is in hand for the supply of saplings to nearby village schools.

23 For public relations, public awareness and assistance to villages, over and above the facilities given above, an amount of Rs, 60,000/- is regularly spent every year.

Raising Public Awareness—Nuclear Style

As mentioned in the previous article, Shri Narayan Desai had written a letter in Gujarati to all the members of the Gujarat Legislative Assembly. This letter had clearly stated what had happened on June 15th and had asked the legislators for:

Constituting an all-party enquiry committee which would investigate and report to the public in a reasonable time. The committee should look into the following:

What were the reasons for the delay of at least 12 hours between the flooding of the turbine room and the declaration of site emergency?

What were the reasons for declaring the site emergency?

Why were the people living In the vicinity (within 30 kms) of the plant, not informed of the situation?

What was the extent of the damage to the waste management area? How many waste filled drums are kept at different locations within the KAPS premises? What are the contents of these drums?

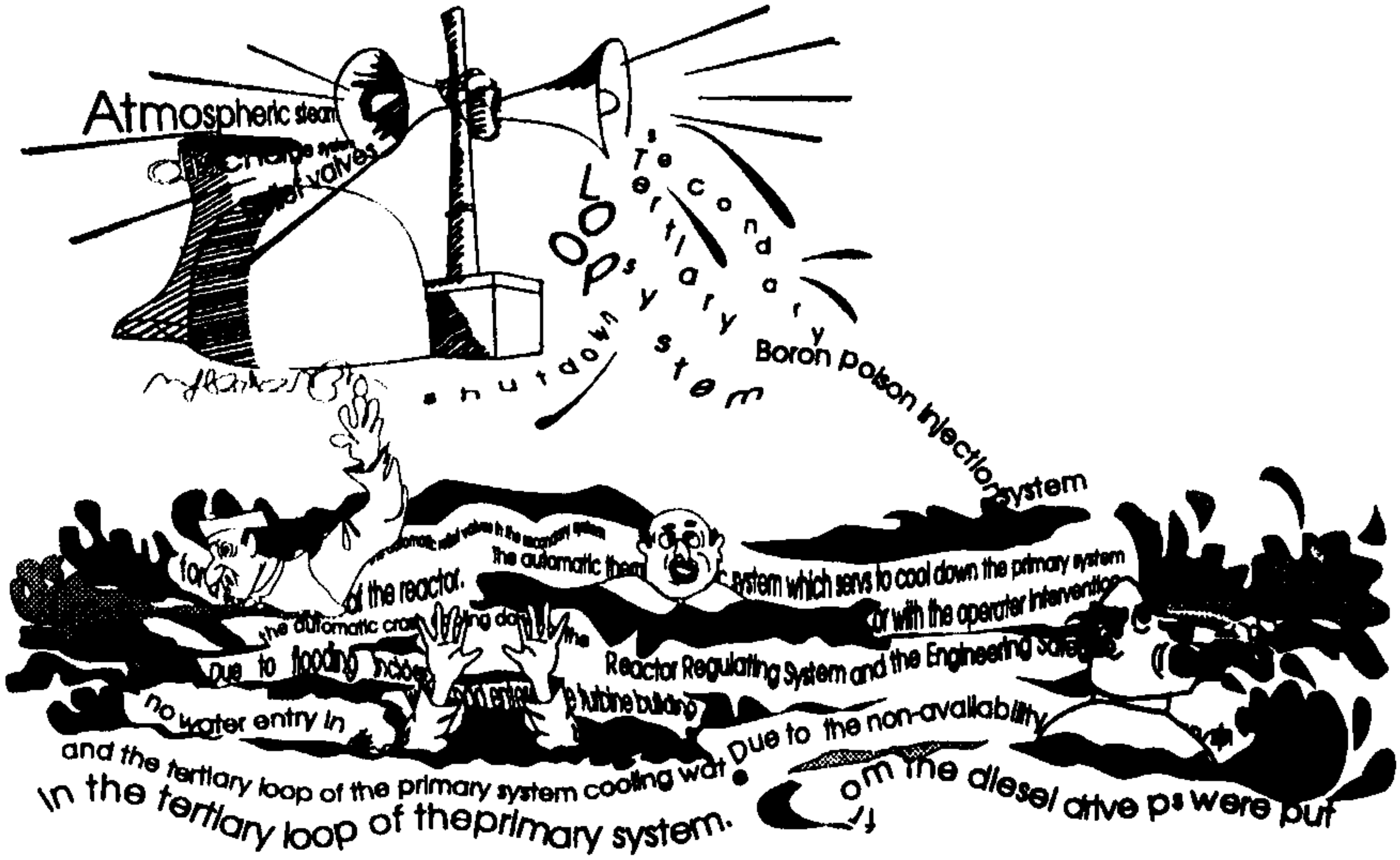
What amount and kinds of radionuclides were released to the environment? What are their long term Implications for public health?

B How do the authorities propose to evacuate the public in case of emergency during monsoons when the condition of the roads makes the task Impossible?

Most members of the Gujarat assembly were too busy to bother about the letter in any way leave alone constitute a committee. This was especially true of our local MLAs whose constituencies would be directly and immediately affected in case of any accident at Kakrapar. Mr. Nitin Kumar Patel, the member for Kadi in Mehaana district of North Gujarat, sent the letter to the Kakrapar authorities. Below we are reproducing some operative portions from the reply.

"Before we furnish our specific comments on the letter of Shri Narayanbhai Desai, we would like to reiterate that Kakrapar Atomic Power Station is a nationally important venture of the Government of India employing a frontier technology. The Nuclear Power Corporation of India Limited who is entrusted with the responsibility of designing, constructing, commissioning and operating of the Kakrapar Atomic Power Station has four decades of technical expertise in the nuclear field. This power station has all the required safety provisions to foreclose eventuality of any accidents. The Station is designed and operated in accordance with the codes and guides of the International Atomic Energy Agency and the Atomic Energy Regulatory Board. The guidelines set by the International Committee on Radiation Protection are also followed scrupulously. In addition, NPC in association with the Government of Gujarat has drawn out detailed emergency preparedness programme for handling any plant/site emergency. There need be, therefore, no apprehension whatsoever about the safety and security of the Kakrapar Atomic Power Station."

"With reference to the letter of Shri Narayanbhai Desai, we herebelow give our comments:


Atmospheric steam discharge system relief valves
Secondary Loop system
Tertiary system
shutdown
Boron Poison Injection system
the automatic relief valves in the secondary system
The automatic therm
system which serves to cool down the primary system
or with the operator intervention
of the reactor.
the automatic crash cooling down the
due to flooding incident
Reactor Regulating System and the Engineering Safeguard
turbine building
no water entry in
Due to the non-availability
and the tertiary loop of the primary system cooling wat
in the tertiary loop of theprimary system.
om the diesel drive p's were put

The Real Flood

The flood water entered the Turbine Building and submerged the equipment on the .secondary system and the tertiary loop of the Reactor systems. The condensate pumps, the Boiler feed pumps etc. serve the secondary loop of the main Reactor systems. The active high pressure and low pressure process water serve the tertiary loop of the main systems. Due to the non-availability of the above systems there are different other systems like the shutdown cooling in the Reactor Building,' atmospheric steam discharge system in the secondary systems, the automatic relief valves in the secondary system, the automatic crash cooling down of the reactor, the automatic thermosyphonic system which serve to cool down the primary system without or with operator intervention. If the reactor is in operation stage then the reactor protection system, reactor regulating system and the engineering safeguard features are designed for a safe shutdown of the reactor. Due to the flooding incident, water had entered the turbine building and there was no water entry in the reactor building which remained in the normal condition. Due to the non-availability of the secondary systems and the tertiary loop of the primary system cooling water from the diesel driven pumps were put into service in the tertiary loop of the primary system i.e. the cooling water portion of the shutdown heat exchangers and the same thing could have been done if the reactor had been in operation. This is the provision of the systems and the design provision had been utilised. Due to the flooding incident the secondary systems in the form boiler feed pump, condensate pumps became non-available. If the reactor was in operation the heat removal of the secondary systems would have been done by the atmospheric steam discharge valves and the relief valves. These are given in the design provision so it is being emphasised that the flooding incident has not jeopardised safety of Kakrapar Atomic Power Station and the systems provided in the design had been utilised to meet the situation."

The letter goes in the same vein for five full pages. I will not test the patience of *Anumukti* readers by reproducing it in full. This is just an example of the kind of junk served by these worthies in answer to honest queries regarding their performance. Can any one, even they themselves in their sober moments, make sense of what they have written? All they want to really say is that they managed to cool the reactor by using diesel pumps which luckily did work in time and in case the reactor had been functioning the same process might have sufficed. Obscured in all this verbose jargon is:

the fact that despite four decades of experience in the field they had no clue regarding *ways to prevent the calamity from taking place such as ensuring proper drainage.*

It was pure luck that the diesel pumps were also not drowned in the floods. The authorities had not taken any concrete steps to prevent the water rising in the turbine room except to curse the irrigation authorities for their inefficiency and incompetence in being unable to open the gates of the reservoir. Had the water level risen a little more, the diesel pumps would have also drowned and even this fig-leaf of an excuse would have disappeared. The fact is that drowning of the reactor in floods was an "inconceivable" accident to them and the people of the state and the country could have paid a crushing heavy price for lack of foresight and imagination on part of these guardians of public trust.

Regarding the detailed questions on the radioactive waste the letter has this to say:

Solid wastes generated from the different areas are stored in drums and then the drums are kept in earth trenches. This is as per the design, the same thing being done for very low active **wastes.** The high active wastes are stored in RCC trenches and high integrity tiled holes. Due to excessive rains, the earthen trenches became full with water. Only one drum lid opened and two bags came to the surface. The bags, which contain low active cotton wastes, are already contained in plastic containers so the spread of radioactivity was not there. The **floating** bags of 2 Nos. were already within the fence only so the spread of contamination is out of question Any spread of radioactivity in the area will be located by the bore holes (32 Nos.) which are located around the solid waste burial ground. All the borehole samples are analysed and found to be below detectable level.

Nice to know that we have the Mate of the art technology: fences and plastic bags to nave us.

But what takes the cake and leaves me speechless is the following:

'There is no effort by the Station authorities to keep anything in the dark. Shri A. K. Asrani, Director (DR&I), AERB and his representatives. Director (Projects), the Chairman of Safety Analysis Review Committee for Operating Plants (SARCOP) and Advisory Committee for Projects Safety Review (ACPSR) have visited the site and the matter has been very much open to the public."

Surendra Gadekar

After a long period of blissful dormancy, nuclear plants nave suddenly started going on-line

Nuclear Should Get Its Act Together

Dr. A. Gopalakrishnan, Chairman,
Atomic Energy Regulatory Board

There was a time that I would present arguments from nucleocrats in all their gory and boring detail just for the pleasure of chopping them to bits. These childhood pleasures are hopefully a thing of the past and now-a-days I am loath to give them any space in Anumukti at all. I believe that the nuclear establishment, however strapped for cash it might be, has no dearth of money for advertising its views and no lack of 'friends' in the media. But sometimes one does come across an article, which, considering its source, is so Anumuktish, that one has to make an exception. However, in the present case, it must be stated that the article has been edited in the interest of brevity and provided with heading and sub-titles. Needless to add that Nuclear can never get its act together.—Editor

Current Status

The two 220 MWe unite each at Narora and Kakrapar are on line, and this 880 MWe will be poised in the near future for operation at its full rating.

In the case of Rajasthan Units-1 & 2, AERB is still awaiting the final decision of the Nuclear Power Corporation. From what we know, it would appear that RAPS-2 is ready for en-masse coolant channel replacement and would be under shutdown for at least three and half years from the time the retubing effort is initiated. Therefore, the earlier that NPC embarks on this task, the better it would be, since a great deal of careful planning, review and preparation will be needed in this first-of-a-kind effort. As for RAPS unit-1, it is doubtful whether we can authorise its re-start without a complete in-service inspection of all its pressure tubes. Whether or not NPC intends to continue the operation of RAPS unit-1 under the present circumstances is also a matter in which we are awaiting NPC's decision.

Overall, what DAE needs to do in Rajasthan is to cut its losses as much as possible and expedite the rehabilitation of unit-2. It would help if NPC is given a totally free hand in this endeavour, without imposing unnecessary policy constraints on how and from where they should manage to get the required assistance to meet this objective. The primary concern should be to minimise the overall loss of time and money.

> *'What DAE needs to do in Rajasthan is to cut its losses as much as possible."*

Safety Should Not Be Ignored

In the case of Tarapur 1 & 2. we appear to have come out of the uncertainties in fuel availability. Over the last two and half decades, it is creditable that the Tarapur units have contributed a notable percentage of the nuclear electricity supplied in India. However, we have to be conscious that these are the oldest of our power reactors, having seen almost 25 years of operation since their commissioning. No boiling water reactor of the same vintage is currently being operated anywhere else in the world. Wherever such older units elsewhere are stated to have been decommissioned because of "economic reasons", a closer look reveals a different picture. The only alternative to decommissioning these reactors would have been to make all the mandatory and costly additions and improvements to their safety related sub-systems. Considering the fact that these alterations were decided after extensive consultations between the General Electric Co., who is also the designer of the Tarapur Units, and the US utilities and their regulatory agency which manage a total of over 35 BWR units, it is not prudent for us to ignore them totally. The situation is further complicated by the recently observed core-shroud cracks in 11 out of 19 BWRs so far examined, which indicate an urgent need for core-shroud inspection also at Tarapur. Added to this, the extensive leaks in the secondary steam generator tubes in both units of Tarapur have resulted in the steam generator shells now serving as part of the primary system boundary — a situation not envisaged during design.

Overall, therefore, fuel being available for TAPS is only the alleviation of part of the concern. We need to settle also the uncomfortable questions related to safety, including the ones which I mentioned. This can be done if we give the right priority and emphasis to these issues. AERB will be soon seeking for an action plan from NPC in this regard and we hope the schedule for inspections and corrective steps to be evolved will match the relative urgency of the issues, consistent with their safety significance.

Unrealistic Forecasts

The Kaiga project is partially held up due to the unfortunate delamination of its inner containment dome. The actual work on the dismantling and removal of the failed dome, NPC's own investigation of the failure and the re-engineering of the dome are all lagging behind their original schedules. We need to avoid giving unrealistic initial schedules and ending up in unusually large slippage subsequently. This was done in the case of Narora rehabilitation work and the same practice occurs even in the delivery of documentation and data NPC has been promising to AERB and its committees. As it stands, the AERB Investigation Committee on Kaiga Dome Failure is also unable to complete its work due to non-availability of certain material test data and crucial reports from NPC. NPC management must expedite these inputs so that NPC can proceed on with finalising the re-engineering of the dome. Unfortunately, the delay in the finalising the Kaiga dome will affect also the time schedule for Kaiga-2 and RAPS 3 & 4, where also identical inner containment structures are to come up. In passing, let me state that the inner containment dome failure at Kaiga makes it imperative that similar domes planned for the 500 MWe project will have to be subjected to a thorough scrutiny by a competent independent agency before they are approved for construction.

We need to avoid giving unrealistic initial schedules and ending up in unusually large slippage subsequently. This was done in the case of Narora rehabilitation work and the same practice occurs even in the delivery of documentation and data NPC has been promising to AERB and its committees.

No Money

Today, the most serious concern that troubles the NPC is the lack of financial support. As I understand, neither NPC is able to raise much funds from the public nor are they getting adequate financial sources from the government. With the impending long shutdowns of the RAPS-1 &2 units and the potential delay in commissioning of the Kaiga units - 1 and 2, the income to the Corporation will decline, even though Narora-1 and Kakrapar-2 coming on-line will partially offset these losses. There is also the unavoidable expenditure of en-masse retubing of RAPS-2 as well as the cost of inspections and retrofits which may be necessary at TAPS. Down the road, NPC will have to face similar en-masse pressure tube replacements in Madras and Narora units in the not too distant future. Added to these is the question of finances required for the Kudamkulam project and the two 500 MWe units to be constructed at Tarapur. In the light of all this, it is obvious, that unless the viewpoints of the Planning Commission and Finance Ministry change considerably in their favour, the Nuclear Power Corporation will find it hard to comfortably survive through in the near future and come out as a viable business enterprise in the long run.

I am not aware of the discussions which have taken place between the DAE and the other Government agencies in this regard. However, from all available indications, it would appear that the Government and especially the Planning Commission, are not convinced enough that increased budgetary allocations for nuclear power in the current setting are bound to bring tangible returns. Performance of our stations and the high cost of nuclear power generation also appear to be under serious questioning.

In short, nuclear power is at crossroads and it is necessary that the DAE and the NPC urgently formulate a strategy and action plan to enhance governmental and public confidence in nuclear power. This will require an impartial introspection of the current situation and an openness to listen to diverse opinions, including constructive and not-so-constructive criticism both from inside and especially, from outside the DAE family, To my knowledge, I am not aware of such serious dialogue on the subject of nuclear power, involving also the power sector experts, administrators and planners in the country.

Steps Needed For a Resurgence in Public Confidence?

NPC could set a reasonably high target on a two-year capacity factor to be demonstrated in the 880 MW comprising the Kakrapar and Narora units. They could plan and estimate the realistically highest targets feasible in this regard, commit the same to the government beforehand, and deliver what is promised. This would indeed serve as a demonstration of an improved managerial performance on part of

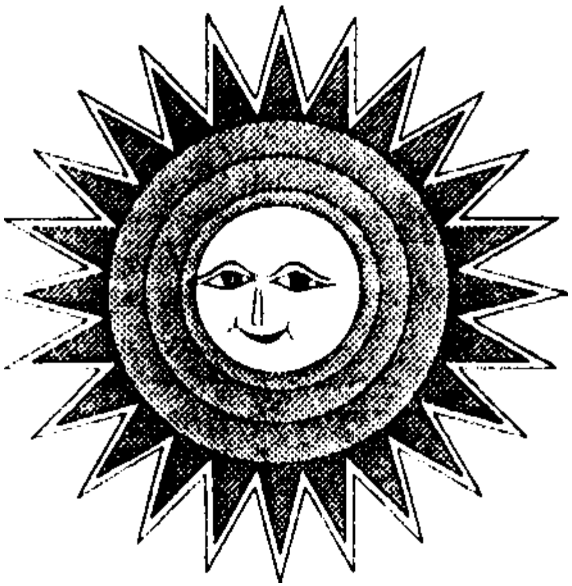
NPC and the Department of Atomic Energy (DAE).

The Madras Atomic Power Station is a site where, in my view, NPC should speed up its efforts to safely increase the operating power level. After a long delay, only couple of weeks ago, AERB has received a proposal from NPC on this matter. There had been some differences of technical opinion within the DAE family on the acceptability of the NPC proposal and it may be necessary that a larger group, involving non-DAE experts, will have to evaluate and settle the issues. I cannot see why MAPS power level cannot be raised within the next six months, and a high capacity utilisation factor maintained thereafter, if such an evaluation identifies no problems.

Constraints

NPC and DAE should start doing realistic project planning and present their plans and defend them even if the schedules are not so attractive. What is happening today is the presentation of a highly optimistic plan at the outset, known to contain unattainable milestones, followed by subsequent presentation of excuses for lapses. This may be the age-old approach to get initial financial approvals, but it leaves certainly a wrong impression of our ability to plan. Furthermore, this practice motivates the internal staff to have no commitment to such a plan since they know that it has been framed without much seriousness.

A crucial necessity for the success of NPC is the availability of adequate technological assistance in a timely manner. Unfortunately, NPC is not self-sufficient in all the required engineering and technological areas, since the intention has been NPC should be provided prompt assistance by institutions like BARC, IGCAR etc. However, today the interaction between the R & D institutions of DAE and the NPC leaves a lot to be desired. I feel NPC should be given freedom to seek and obtain assistance from other sources both inside and outside the country. We cannot expect a power corporation to function efficiently and grow in today's competitive world, if their destiny is solely and closely controlled by the R&D establishment who, in turn, are not able to deliver usable end-results on schedule. Since, in the overall interest, the highest priority of all DAE technological groups should be to provide the necessary support to the nuclear power sector, NPC becomes the focal point for utilising their services. Thus, it is only logical that the performance of these auxiliary institutions should be judged by how well they provide useful and timely assistance to NPC. It is time that the role of various DAE institutions in supporting the Nuclear Power Corporation is subjected to an urgent down to earth review.



Sum: The Only Safe Source of Nuclear Energy

Good Money After Bad?

Extensive studies on viable scenarios for environmentally acceptable electricity generation have been carried out by some institutions in the country. Given the high ash content of Indian coal and the projected resource position for various fuels, almost all these studies have come to the imperative conclusion that nuclear power has to become a strong component of the total electricity production in India by the early part of the next century. Having created extensive and expensive infrastructure in India for supporting nuclear power, neither the public nor the government can afford to let it whither away, due to our inability to manage the interfaces appropriately. I hope the NPC and the DAE will take the present decline in government and public confidence in nuclear power as a forewarning, and initiate corrective steps. Otherwise, it is not unlikely that alternate organisations and control structures may come up in due coarse to get things done which we may fail to do.

(Invited talk: "Nuclear Power: Statue and Prospects" delivered on 9.1.'96 at BARC, Bombay)

Editor's Note:

Incurable Optimists

It would be indeed funny if it were not so sad, that researchers in prestigious institutions who conduct studies of future energy scenarios have such a blinkered (Coal, hydro, nuclear) vision. How come they cannot make out after nearly forty years experience world-wide and more than twenty-five years in India, that nuclear does not deliver the goods, only the bads, To make studies without taking into account long years of actual field performance shows a stuck-in-the-rut mentality. The performance of old nuclear plants in India was no great shakes to begin with, but the performance of new nuclear plants in India is much worse than that of old ones in the corresponding periods of their lives. What is urgently needed is letting in some Sun.

The Golden Goose Stops Laying

Tarapar Reactors Stalled for Want of Funds

The much awaited (by masochists—editor) execution of two additional upgraded nuclear power projects of 500 MW each, at Tarapur, has virtually been stalled for the past two years, for lack of central funds.

Sophisticated equipment, including calandrias, reactor headers, pressurised and primary heat transport pumps worth crores of rupees have been laying idle at the project site, with the Nuclear Power Corporation (NPC) spending scarce funds just to preserve them.

Officials of the corporation say that the infrastructure involving an expenditure of Rs 25 crore had already been developed at the site. The proposed two reactors will be Pressurised Heavy Water Reactors of 500 MW each. They were supposed to be first in a series of large sized plants.

An Example of Nuclear Foresight

"Sophisticated equipment, including calandrias, reactor headers, pressurised and primary heat transport pumps worth crores of rupees have been laying idle at the prefect site."

It is purely coincidental that when large orders are made, private corporations do not forget to show their appreciation of the trust placed in their abilities to serve the nation.—Editor

The Central Government had accorded financial sanction for the project in January 1991 and the authorisation for construction was later approved by the Atomic Energy Regulatory Board (AERB) on September 1, 1993. The AERB had already given safety clearance of the site in December 1989.

Explaining the situation, the Executive Director (Operations) of NPC, Y S R Prasad, said that the main obstacle to the execution of the project was funding. He said there were numerous difficulties, the main being resource crunch, since funds have to be cleared by the Cabinet Committee on Economic Affaire of the Central government.

Secondly , the NPC was facing massive problems in obtaining parts and the necessary technology. 'There are restrictions on procurement of equipment. Technology is not accessible to us and work at the site has been hampered for want of funds, new technology and spare parts," he elaborated.

Prasad said that while India could fabricate all the essential equipment indigenously, there were certain restriction in the global market, as a result of which the project had been delayed. He however assured that though work on the nuclear power projects may take some time, work will never be stopped indefinitely.

The proposed two unit PHWR station is located on the western sea coast, adjacent to the existing 2 x 160 MWe Boiling Water Reactor BWR of TAPS, which is celebrating it silver jubilee this year. The proposed PHWR station is based on indigenous technology which has been proven with the successful implementation of the Kalpakkam Atomic Power Station at Madras, Narora Atomic Power Station in Uttar Pradesh and Kakrapar Atomic Power Station in Gujarat. Its operation will be supported by supply of heavy water from the country's heavy water plants and fuel from the nuclear fuel complex, both under the Department of Atomic Energy.

In present ideology of 'economic liberalisation', Prasad was quick to assert that private participation should not be allowed for the construction of the two additional units.

Financial Express
October 5,1994

Is he a Fool?
Or Does He Think You To Be One?

"Mr A.N.Prasad, Director of the Bhabha Atomic Research Centre, said in an interview to UNI that escalating prices of components and the long gestation periods had grossly affected the future of nuclear power in the country though returns were much higher than in thermal power projects. He said the programme had to solely depend on internal generation by the Nuclear Power Corporation and Government funding as no institution, international or national, was willing to finance nuclear power projects."

The Hindu 6 September, 1994

If the returns are so high, then why are national institutions and the markets so reluctant to finance nuclear power projects?

When it comes to Intimidating whistleblowers

The English Are No Better

Trevor Brown spent more than a dozen years warning as many people as he could that safety measures at the Atomic Weapons Research Establishment at Aldermaston were inadequate. His battle cost him his job.

Now, 13 years after he was forced to retire seven years early, he has been vindicated. A report following a comprehensive review by the Health and Safety Executive has said that, had it not been for its immunity from prosecution, the Ministry of Defence could have faced criminal charges over safety at Aldermaston.

Mr Brown was sent to Aldermaston in 1961 to manage a civilian plutonium fast reactor fuel project. It took very little time for him to see that there was inadequate training for line management in safety. The measuring of radiological materials in air was inadequate and there was not access to independent experts to discuss safety measures.

'The management said it was a top secret site and they did not want independent experts," Mr Brown said. "I had to accept the situation." The authorities in fact claimed that safety standards at Aldermaston were so high that they were thinking of making economies by reducing the number of safety staff.

However in 1977 Mr Brown won an agreement from the management that there should be some personal air sampler trials to see how much plutonium was floating around. Until then, measurements had been taken 8 feet above ground in the workplace.

For a week Ken Cummins, a chargehand, wore a sampler around his neck. In that week he breathed in three quarters of a year's dose of plutonium. Mr. Cummins died two years later from bowel and liver cancer. His family believes that Aldermaston was to blame for his death.

Whistle-blowers'

When they hear the whistle blow,
security will know,
that it's time for them all to listen in
—to monitor your phone,
redecorate your home;
yes, it's time for them all to listen in.

When you have got a complaint,
and the boss man says it ain't,
then its time for them all to listen in
—park their van down the block,
all your visitors to clock;
yes, it's time for them all to listen in.

The results of the sampling caused a sensation and Mr Brown was now allowed to speak to an outside expert at the Nuclear Protection Board at Harwell. There he was shown the International Committee for Radiological Protection regulations which stated that it was not enough to sample just one point of a room. Sampling must also be done in the breathing zone of the worker. Neither Mr. Brown nor, as far as he knew, other workers at Aldermaston had seen these regulations before.

In 1978 all plants at Aldermaston were closed down and Sir Edward Pochin conducted an inquiry into radiological safety. He found significant worker contamination and that air samplers in the chimney stack were upside down.

Yet still not much happened, and in 1980 when Mr. Brown was asked to appear on a television programme, he sought the Ministry of Defence's permission. He was told that to do so would be in contempt of court, a reason neither he nor Berkshire council's solicitor understood.

A further request for permission received no response, so he appeared on the programme. '1 made a very mild comment that perhaps excessive secrecy had interfered with safety," he said. "All hell broke loose."

He was severely reprimanded and in 1981 was forced to retire. Today, aged 71, he wonders why it took so long for this latest review There was so much secrecy, an unnecessary amount," he said. "Whether there was a real danger, we do not know. But that is in itself a danger.

Victoria Macdonald

The Worst Nuclear Practice Ever

Russian scientists have disclosed that for more than three decades the Soviet Union secretly pumped billions of gallons of atomic waste directly into the earth. They say the practice continues in Russia today.

The Russians told a small group of Western experts that Moscow had injected about half of all the nuclear waste the Soviets produced into the ground at three widely dispersed sites, all thoroughly saturated. The three sites are Dimitrovgrad near the Volga River, Tomsk near the Ob River and Krasnoyarsk on the Yenisei River. The Volga flows into the Caspian Sea while the Ob and Yenisei flow into the Arctic Ocean. The amount of radioactivity injected is more than three billion Curies. For comparison, the Chernobyl accident released about 50 million curies of mostly short-lived radionuclides. The accident at Three Mile Island released about 50 curies. The Russian discharges are mostly long lived radionuclides like caesium-137 and strontium-90 which have half-lives of nearly 30 years which means that the threat from these discharges would remain potent for more than a few hundred years.

Russian scientists claim the practice is safe because the wastes have been injected under layers of shale and clay which in theory cut them off from the earth's surface. But already, the wastes at one site have leaked beyond the expected range and "spread a great distance." The Russians have not elaborated on what is meant by great distance—metres, kilometres or has it already reached the surface? The disclosure has set off a debate among experts over the likely consequences of these injections. It would be centuries before we know whether the injections are actually harmless. A catastrophe could occur much sooner.

Upon learning of the injections, Dr Henry W Kendall, a Nobel laureate in physics at the Massachusetts Institute of Technology said that "Far and away this is the largest and most careless nuclear practice that the human race has ever suffered."

TVA Throws in the Towel

Work Halted on Last Reactors Under Construction in the US

On 12 December the Tennessee Valley Authority, one of the largest American power producers, said it would halt work on the last three nuclear power plants under construction in the United States. Two of the unfinished units are at the Bellefonte Nuclear Plant near Hollywood, Alabama. The third, Watts Bar Unit 2, was being built near Spring City, Tennessee.

According to *International Herald Tribune*, the decision "is the symbolic death notice for the current generation of reactors in the US.

TVA once had the most ambitious nuclear programme in the country, with 17 reactors on order. Only five units were actually built and only three of those are still operating. The reasons for this failure are the same which dog nuclear power all over the world: High costs. Besides there was the uncertainty regarding whether the plants once constructed would actually be brought on line.

TVA has already spent US $ 6.3 billion on the units (they were 67%—88% complete), and the authorities estimated that another $ 8.8 billion would be needed to finish them. This was too much even for the already debt ridden TVA. 44% of TVA's debt is due to its nuclear programme.

The decision to halt further construction is a major shift in policy for TVA. No new nuclear plant has been ordered in the US since 1978. Many utilities had abandoned the nuclear dream long ago. But TVA, which is owned by the federal government, and protected from some of the competitive pressures, had obdurately continued to press ahead on the nuclear path. A government spokesman said, TVA had to recognise that policies conceived decades ago are no longer viable."

US is led with a substantial but ageing base of nuclear reactors—109 reactors producing 21% of the country's electricity. Although the end of the first generation of nuclear reactors is welcome news, it needs to be kept in mind that nuclear industry is already seeking federal certification for the next generation.

WISE News Communique 424

Public Protest Force Closure off Canadian Nuclear Plant

Widespread public concern about health has forced Canadian authorities not to renew the license of the Pickering nuclear power station where an accident took place on December 10, 1994. The accident was caused by the bursting of a copper pipe and resulted in a spill of 130 tons of radioactive water onto the floor of the reactor containment room.

Around 1.5 million live within 30 kilometres radius of the Pickering Station. They are concerned about their health following the release of the radioactive water from the ageing nuclear power plant. It is at their urging the the Atomic Energy Control Board (AECB), a federal government licensing and regulatory agency has decided not to renew the license of the nuclear station pending detailed investigations.

According to Nuclear Awareness Group, once the water started to spill, a turbine went out of control and had to be shut down manually. The group said that the clean-up of the radioactive water would cost the tax-payers millions of dollars in clean-up. The group suggested AECB should order a full investigation into the plant's safety. The director general of AECB, Mr. Ziggy Domarsky said that "the heavy water spill does not indicate that the Pickering reactors are in trouble. Our plants are designed to be able to handle this type of accident."

He also claimed that the Pickering plant is built to withstand an earthquake measuring 6.9 on the Richter scale even if it occurs directly under the reactors. But Mr. J. J. Wallach, a scientist with AECB, disagreed with Mr. Domarsky's assertion. In a scientific paper published in January 1990, he concluded that the ingredients for a major earthquake exist near the Pickering and Darlington nuclear power stations. He conducted aerial surveys that showed the presence of two anomalies on the floor of lake Ontario. The anomaly is "practically beneath the Pickering nuclear power station," he claimed This 100-page paper is supported by several geophysical maps that detailing various features. The evidence accumulated to date indicates the need to conduct as soon as possible, a ftill scale, fully integrated seismotectonic programme relevant to reevaluating the nuclear generating stations," Mr. Wallach said. But no such detailed investigation has been conducted so far, according to informed sources.

Indian Express December 22, 1994.

Interview with Dr. Rosalie Bertell

It is a great pity that illness prevented the proposed Indian visit of Dr. Rosalie Bertell. Below we are reproducing an interview she gave some years ago to Safe Food News—a US journal devoted to the cause of educating the public about the hazards of food additives and food irradiation.

Dr. Rosalie Bertell is an epidemiologist and Catholic nun who has been involved in environmental health for more than 25 years. She is the President of the International Institute of Concern for Public Health inlbronto, Canada. In 1986, she received the prestigious Right Livelihood Award for her work in "protecting human life and livelihood from ravages of industrialism." She is also the author of the critically acclaimed No Immediate Danger.

Question: How did you get started in what has turned into a life-long commitment to health and environmental justice?

Bertell: I started working on environmental health issues primarily because I was looking at the environmental and hereditary factors associated with an increase **in** leukaemia. In doing so I really discovered the whole world of medical x-rays and the problems they were creating. From there, I became involved in the **nuclear** industry, where I found out to my surprise and horror that **they** were allowed to routinely **release** radiation in to the environment, which, to quote the industry, "gave the people a radiation dose similar to x-rays," which were OK. because your doctor gave them to you. Then I started looking back and wondering who ever told them that it was OK. to give x-rays to people when they were not obtaining a benefit for it like they do with a medical x-ray. I then found out that the regulations for permissible levels were set by the military. So the whole thing kept becoming more and more involved and horrendous.

Question: It seems like many of our environmental problems have their roots in the military. It's hard to comprehend, however, that the military systems supposedly designed to protect us are also threatening our health and well-being.

Bertell: You're right. Many of the environmental problems we're experiencing have their roots in the military. Even the food irradiation programme. We have this addiction to militarism and military ways of thinking. I call it an addiction because it has all the classic signs of an addiction — it's secretive and exaggerated, it sacrifices health and social goods, and it takes the beet and the finest young brains in the country and drains them off into producing weapons of mass-destruction. This addiction to militarism is widely destructive and we are not confronting it.

When we talk about an environmental problem, we say that it is everyone's refrigerator, their underarm deodorant, or it's because they dont recycle paper. We don't say anything about the major things the military is doing to damage the life support system. It's something that we, as a society which is undermining our survival because of a distorted national security syndrome. In the past, it could be somewhat justified as a strategy, but it has now become a self-destructive addiction which needs to be unmasked.

Question: You've been a critic of the so-called "acceptable levels" of radiation exposure. In fact, you've called the acceptable radiation-exposure levels set by the nuclear industry a self-delusion. How did we get to a point where our regulators view certain cases of suffering, even death, as "acceptable?"

Bertell: I think what we're dealing with here is a rather bizarre definition of safety and it comes out of a mentality of risk-benefit trade-offs. Those people who bring us regulations have decided that the setting of regulations is not a public health function. So, regulations are not set in order to protect the public health or the welfare of future generations. That's the trade-off underlying the regulation. The regulation is meant to be a political statement that people accept the cost in life, health, and damage to future generations in exchange for the benefit of the activity. The benefits are economic and social. You have here a pseudo-science. While it is possible to come up with estimates of risks and also estimates of socio-economic benefits, it isn't logical for a society to allow the same persons who are obtaining the social and economic benefits to do the calculation of the risks. It's obviously a biased system. What we've done is said that the people who promote food irradiation, for example, and this applies in many other areas, are the experts. Therefore they can tell us the risks and they can tell us the benefits, and that is certainly an illogical system. What we really need are disinterested parties who speak for public health, the integrity of the gene pool and inter-generational equity. These are the people who should calculate the risks of the proposed activity while the producers of the proposed industry calculate the social and economic benefits, if there are any. Then we must have a public-political process which decides the trade-offs. It is the structure that is wrong. It is not a scientific method and it is not even an acceptable political method.

Question: In other words, our government and various responsible bureaucracies have failed to protect the public from environmental pollutants.

Bertell: Yes. I think environmental pollutants are falling in the cracks between departments of environment and the departments of health. The departments of environment are oriented towards chemistry or engineering. They have technical personnel who go out and measure the pollutant and then they look for some legal limit. The only things they are able to say in terms of health is that you might have a potential health hazard. They do not have the expertise to deal with it on any farther level. On the other hand, if you look at the health departments, they are trained in either one-on-one medical care or they know how to deal with distributing the flu vaccine or dealing with infectious disease. They are not, however, good at all with environmentally-mediated diseases, with diseases related to pollution of air, water or food. Also, they are not trained in environmental health or the kinds of community impacts to be expected when you release multiple toxins into a community's water supply, landfill or local fishery, for example. So you see you've got these types of situations without any bureaucratic body dealing with it. You also have the industry trying to avoid responsibility.

Question: In regard to the combined health and environmental problems facing us, you've said that the gene pool is being damaged at the same time that we're damaging the environment, so inhabitants of the planet are given a double burden. Could you expand on that?

Bertell: Part of the public health orientation is how far into the future do you care? You'll find that many members of the public and many people who deal with hazardous materials have a *very* short timeline of concern. If, for example, you go for an x-ray and you're not sick within 24 hours of the x-ray, it is judged as harmless. The time-span there is extremely short. If you take medicine like chemotherapy, then the timeline might be as long as a week or a month to see whether or not there are any harmful side-effects of the medicine. That's a little longer timeline.

People are now becoming conscious of the fact that an exposure could cause cancer in the next 20-25 years. That's an even longer timeline. What I'm asking for is the understanding that every person who will ever live on this planet is present right now in the sperm and ovum in the people that are living. So these are not nebulous beings who come from outer space, they are people connected to the people who are now living. If you expose yourself to toxic agents that damage the sperm or the ovum, it might take two or three generations or 70-100 years to show up, but it becomes inevitable once sperm or ovum are damaged that this will resurface as serious illnesses in the future.

So I'm looking at the fact that we are doing this kind of damage. We are recklessly releasing mutagens into the environment and c musing this kind of genetic damage It has not taken its total toll yet, eisher. In fact, the first two generations are only 25% of the expected damage. So at equilibrium, that will be four times as much damage coming.

I'm only trying to point out the fact that we have already done this real damage to the gene pool. At the same time we're making the environment more hazardous to live in because we're reducing the quality of air, food and water, and this is the life support system. You can't do both of these things at the same time without introducing species death syndrome. You cannot damage the ability to cope and then give the individual more to cope with and expect to increase life expectancy and the quality of life. It is going to decrease.

Question: It seems like so many of the bureaucrats and corporate executives of polluting companies have forgotten how precious life is and how their decisions impact upon life.

Bertell: They often consider people easily replaceable. They seem to say, "Oh, well, have another baby if this one is damaged." It is a very callous approach to the uniqueness of each human being. And I do not mean just human life, I also mean animal life.

Question: You once called food irradiation "scientifically outrageous and humanly exploitative." Would you elaborate on that?

Bertell: The purpose of food irradiation is to make money for the food producers and the nuclear industry. I think that it's a pseudo-scientific solution, especially in that the radiation-sensitive bacteria or microbes in the food are also the same things that tell you the food is stale. So, food irradiation kills the organisms that produce the odour or change the colour to give you the clue that the food is stale. You never wipe out all the bacteria or microbial life with irradiation because, if you do, you make it limp, colourless and tasteless and it wouldn't be saleable. Therefore, you're only killing a part of that ecosystem and the part that you leave alive **is** apt to be even more damaging to health than the kinds of things that give you a clue that the food is stale. For example, the micro-organism that causes botulism is among the most radiation resistant. As you destroy part of an ecosystem, the surviving microbes that are left fill up the system — they grow without competition.

Safe Food News Fall 1992

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Myths about Power

A macabre myth has been doing the rounds in the country: that India will have to double its installed capacity from its existing level of 66,000 MW to 140,000 MW by the year 2005. This as 'experts' in the Union Ministry of Power will be only to glad to explain, will involve total investments of Rs. 245,000 crores at current costs. Since India cannot raise such vast sums of money, it must look to richer countries (read multinational corporations) for funding support

The Ministry of Power is wrong. So are some of the most ardent defenders of such myths. True, their estimates are baaed on a growth of 6.5 percent per annum in the demand for power. But they fail to realise that India does not suffer from any shortfall in power generation capacity. It only suffers from the problem of power utilisation.

An analysis by Prof. Michael E. Porter (the renowned management guru) and Prof Pankaj Ghema wat of Harvard Business School shows up two important points: (a) that India does not produce as much power as it should, and (b) that India does not use all the power it can produce. In their stucty, they also arrived at the conclusion that of the 65,000 MW of power that it can produce every year, India actually finds itself using barely 21,000 MW of power annually, (see table next page)

As much as 7,800 MW of power is lost every year because of planned maintenance. Since such maintenance cannot be avoided, if power plants are to be run at their optimum levels over a period of time, this is a loss which India's planners must accept as being inescapable.

* That leaves India with 57.000 MW of power. But even at this stage the country is confronted with the problem of the manner in which unplanned repairs take place, which collectively account for a loss of an additional 10.400 MW every year.

* Lack of logistic support in ensuring timely availability of coal and other requirements causes an annual loss of 9.800 MW.

* Around 1.000 MW a year Is Just not used because the state electricity authorities have not managed their respective power consumption patterna effectively enough.

* Lastly, a whopping 15.000 MW of power ia allowed to slip away through transmission and distribution losses.

* It is because of the cumulative effect of losses at every stage, that India ia in a position to use Just 21.000 MW of power every year. Even If one discounts for loss of capacity utilisation due to planned maintenance, one still arrives at a total avoidable loss of an Incredible 36.200 MW of power every year.

The magnitude of the loss can be better comprehended if one

Stage	Power Available	Loss	Causes
1	**65,000**	**7,800**	**Scheduled unavailablity / planned maintainance**
II	**57,200**	**10 400**	**Unscheduled unavailability / unplanned repairs**
HI	**46,800**	**9,800**	**Forced outages due to lack of coal etc.**
IV	**37,000**	**1,000**	**Power not used**
V	**36,000**	**15,000**	**Transmission and distribution losses**
VI	**21,000**		**Net available power**

urea it by a proper yardstick: the Governments first (reckless) award of a power generation project to Enron. The total amount of power lost in India is equivalent to 18 Enron projects. Alternately, working on a normative cost of 3.4 crore per MW for all private sector plants which have been guaranteed profits by the government, the government could have saved Rs. 126,700 crores by not installing additional power generating capacity. But then if such losses were contained, how could India's bureaucrats in the power ministry and the prime minister's office, as well as the ministers themselves bestow largesse on their favourites!

Not Out of Ignorance

The above facts are known to the government. That is why India's planners thought it fit to set up the Power Finance Corporation almost a decade *ago* to refurbish old and ailing plants. That is why some planners insist there is a crying need to let the private sector take up ailing plants on lease for 15 years or so, and help turn them around. That way, the government could save as much as 36,200 MW of power every year.

Yet the government does precious little about reconditioning existing power plants. It is in a hurry to award even more new power projects to private sector entrepreneurs. The centre's recklessness has been matched by the MoU mela recently introduced by the state governments of Andhra Pradesh and Karnataka.

The reasons for such aberrations are not hard to find. Obviously, when such large sums of money are involved, why bother if the country loses Rs. 36,000 crores every year?

That is how, despite all the talk about power, the people of India are condemned to a state of continued powerlessness.

R.N.Bhaskar
Indian Express 272.1996

Editor's Comments:

This article makes no mention at all about nuclear power. That is but natural, since in any serious discussion of the power situation in India, nuclear power which contributes a mere two percent of the capacity and much less than two percent in terms of electricity, just does not count.

Transmission and distribution losses are generally said to be around 20—25 percent in India. The figures quoted in the table seem to say that this figure is not really correct. While these losses are 25% of the total capacity, they are an enormous 42 % of the electricity actually being produced. I would be surprised if any other country in the world conies close to us in such profligacy.

Manohar Singh

Anumukti deeply regrets the untimely and painful death of Shri Manohar Singh of Tamlao village. He was a brave man who fought his misfortune with courage and fortitude. His outspoken condemnation of nuclear power operations gave courage to many others. Below we reprint his story in his own words:

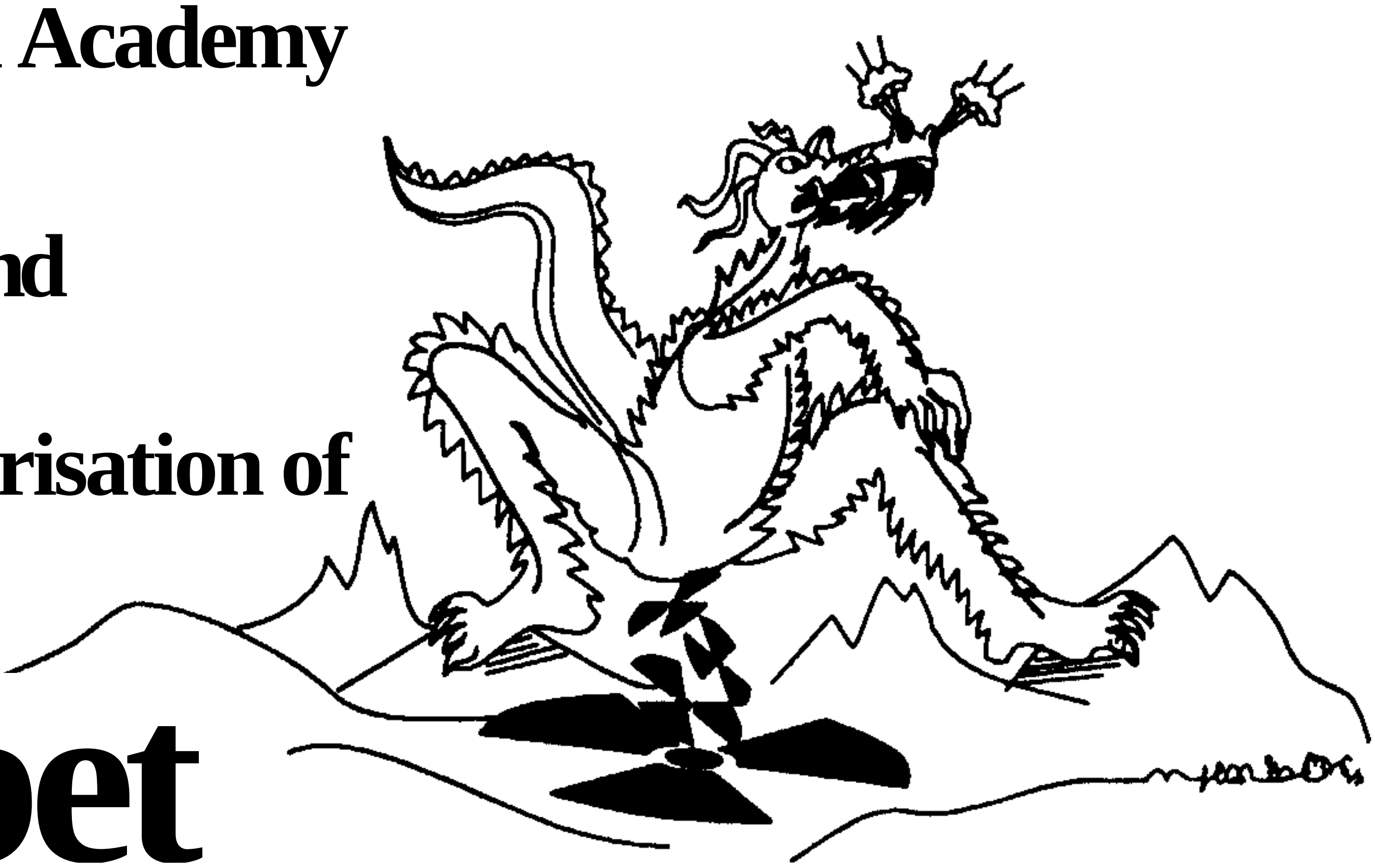
"I used to work in Waste Management. Once, I received a dose of 2,200 mrem in half an hour. Others have been laid off after getting a dose of 800-1,100 mrem. Most workers get this much dose in six to ten days of work. One needs to work for just half an hour to one hour every day. You receive more exposure during shut-downs. The work involves moving material. Machines are used for heavy loads, but if the load can be lifted by one or two persons, then machines are not used. My lungs have become bad. I dont smoke. I have gone to many different hospitals for treatment They treat you for T.B. After a few days, the doctor tell you to stop taking the drugs. Then, they restart the treatment all over again. I have developed these burn-like red marks (keloids) all over my body. One of my mates in the plant, suffers from exactly the same problem. I have a seven year old son. He was born with a sternal deformity. Ever since birth his rectum comes out when he shits. Despite knowing the dangers of working in the plant, people go there because they get better wages. If I have to starve, I will starve, but I will not work at RAPS."

The Ninth Academy

And

The Nuclearisation of

Tibet



Tibet, the high plateau in the magnificent Himalayas, the land where many major rivers of the region including the Brahmaputra (Tsangpo in Tibet), Indus and Yangtze originate, has been a victim of the nuclear madness. It is an irony that the land of the gentle Buddhists is being ravaged by nuclearisation. We give below some extracts from a comprehensive report, NUCLEAR TIBET, by the International Campaign for Tibet (ICT) which is a Washington-based, Tibet monitoring advocacy group. The report is the result of a year-long research effort. The methodology of the report included library research of Chinese and English language materials; interviews with Chinese nuclear experts, government officials and Tibetans, fact-finding missions, laboratory sampling of soil and biotic materials; and measurements of selected sites for radioactivity with Geiger counters. The Report is dated April 1993. In this article, we focus on just the Ninth Academy—the nuclear weapons research facility. We will have a separate article on the other Chinese nuclear activities in Tibet in a future issue.

Highlights of Nuclear Activities in Tibet

The nuclear activities of the occupying Chinese authorities include:

- Building a top-secret nuclear city, the "Ninth Academy" where moat of Chinese nuclear weapons were designed and inbricated.

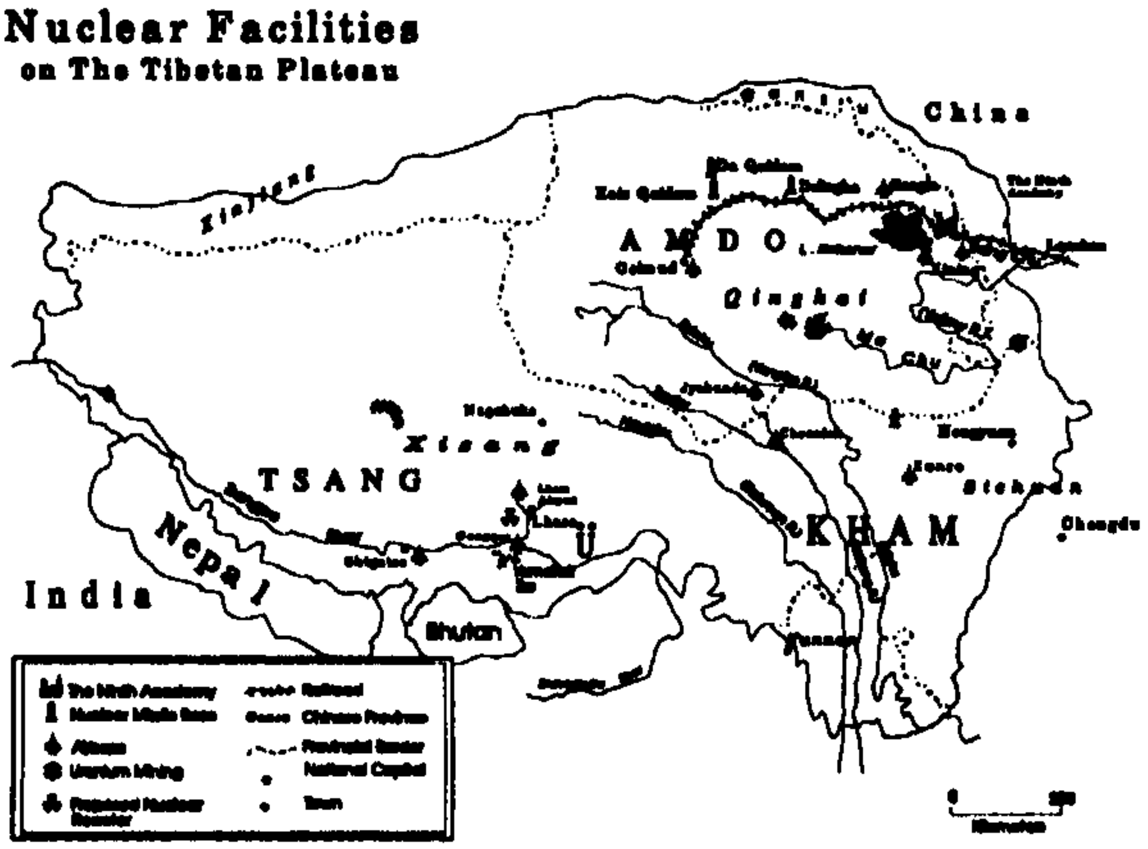
* Dumping an unknown quantity of radioactive waste from this facility, and near uranium mines. There are credible reports of illness and death among tribes In the area.

Deploying nuclear weapons in at least three sites, one of which Is accessible only by a rugged dirt road posing transportation risks. By these deployments of nuclear missilles and facilities. China has negated the historical buffer tone role of Tibet.

Aliegations of dumping of other countries' nuclear waste wars unconfirmed. But the resesrch team thinks that though this is unlikely to have happened in the past, it is vary possible in the nature. Shipment of high-level Taiwanese nuclear waste to China for disposal is very likely and that waste may go to the Tibetan Plateau, according to credible sources.

There is also a proposal to build s nuclear reactor in Lhasa to meet the increasing energy demands of Chinese settlers and enteterpries.

Chinas nuclear programme is only a fraction of the size of those of the US or the ex-USSR in terms of the nuclear arsenal, number of test axplosions and the volume of nuclear waste generated. But in the areas of nuclear proliferation, lack of worker safety and irresponsible waste disposal, China's record is as poor or even worse than those of other nuclear powers. The implications of this situation for Tibetans, Uygurs and Mongolians is truly frightening. Any movement toward making Tibet a nuclear free zone, as proposed by the Dalai Lama and others, will have to address the nuclear ambiguities between China, India and Pakistan and each of their security needs.



The Ninth Academy

The Northwest Nuclear Weapons Research and Design Academy was called the "Ninth Academy" because it was under the jurisdiction of the Ninth Bureau. It was constructed in the early 1960's in the Haibei Tibetan Autonomous Prefecture, Quinghai Province, Haiyen County, near the shores of Lake Kokonor. Parts of this huge facility are located underground to deter detection and possibly attacks. All the functions of the Academy are not known But it is clear that it was responsible for designing all of China's nuclear bombs through the mid-1 9701B. For this purpose the facility designed and carried out non-nuclear explosions. It also served as a research centre for detonation development, radiochemistry and other weapons related activities.

Although its primary function was research and design, it also assembled components of nuclear weapons. According to Indian researcher, S. Devakinandan, the plant produces approximately 300 kgs, of weapons grade uranium and that China's hydrogen bombs were probably fabricated at Haiyen. The Ninth Academy is one of China's most closely guarded secrets and rarely mentioned in Chinese or Western publications.

History of Ninth Academy

China's occupation of Tibet began in 1949. In 1968 the Chinese Communist Party's General Secretary Deng Xiao Ping formally approved construction at the site. By the end of that summer, over 10,000 construction workers were working in the sheltered valley to the east of Lake Kokonor. Geographically, the area is a high altitude desert and was called "gold and silver sand". Due to the isolation and climatic factors of the site this construction force was found insufficient. Authorities reinforced the work-force by including prisoners. The use of prisoners to construct industrial infrastructure is well documented in Communist China and Qinghai is considered China's "Siberia". Harry Wu, a former prisoner and China prison expert, reports that labour reform camps in Qinghai use prisoners to excavate radioactive ore and they are forced to enter nuclear test sites to perform dangerous work.

The Ninth Academy was partially opened in 1963 and was fully operational by 1967, during the Cultural Revolution. Prior to the opening of the Academy, nuclear weapon design was conducted at the Beg ing Weapons Research Institute. After the Academy was opened, the top scientists and the principal work were relocated from Beijing to the Tibetan Plateau.

Nuclear Weapons Production

In 1964, the Ninth Academy conducted the first 1:1 model blast experiment at a site near the facility. China's top nuclear scientists continued to gather at the Ninth Academy to refine, update and develop all of China's nuclear weapons technology through the late 1960's and early 1970's. In the late 1970's, the Academy established a Chemical Industry Institute which conducted comprehensive experiments" on reprocessing highly enriched uranium fuels. In the area of low-concentration fuel reprocessing, the Academy's vertical shearing machine had a daily processing capacity of as much as 400 kgs of uranium. In 1987, China disclosed some more information about its highly secretive nuclear programme in a book, *Con-*

temporary China's Nuclear Industry, by Lie Jue et al. Lie Jue was the men instrumental in selecting the locale of the Ninth Academy in the Tibetan Plateau. In late 1991, the most authoritative publications maintained that the Haiyen facility was "still China's main nuclear weapons research and design centre. However, it appears that various functions of the Ninth Academy were gradually moved to different locations, mainly to Sichuan Province to the south, where they remain today. It is possible that all of the Academy's nuclear functions were moved away from Haiyen by or during the 1980's. Tibetans in the area who were interviewed said that many of the soldiers guarding the facility were removed in themid-1980's.

The economy of the Haiyen County is dominated by the Ninth Academy. But there is substantial agriculture and animal husbandry activity. Per capita income is more than double that of other counties in Qinghai. Heavy industrial output is 72 million yuan, about seven times that of surrounding counties. These figures are likely to account only for the supporting infrastructure of the facility and not for the output of the facility itself

Radioactive Waste and Health Effects:

The nature and quantity of radioactive waste generated by the Academy is unknown. Waste disposal methods have been reported as being extremely casual. Initially, waste was put in shallow, unlined landfills. Since no records were kept, the nature and location of much of the waste will be extremely difficult to ascertain. Understanding the hydrology and geology of Haiyen county will play an important role in assessing the methods and pace of the haxardous dispersal of the radioactive waste.

The shallow landfills created in the 60's and 70b may be leaking into the groundwater and watershed at a faster rate now than in the past years. Underneath the Ninth Academy are a series of natural aquifers, which are charged and replenished by surface waters, streams and underground streams and sometimes comprise of underground lakes. Underground water supplies in Qinghai have been diminishing at a rapid rate and usable underground water is very limited. This may make any radioactive contamination of ground water a matter of great concern.

On the peaceful nuclear front

Full Steam

China plans a rapid expansion of its nuclear power generation programme. This makes it the most promising market for nuclear suppliers. Presently three nuclear power stations are operating, one at Qinshan near Shanghai with a capacity of 300 MW and another at Daya Bay near Hongkong with two reactors of 900 MW each. A district heating system with energy provided by a small nuclear reactor of 5 MW is operating in Beijing.

By 2010 China hopes to have an installed nuclear capacity of 15,000 to 20,000 MW. At present more than ten provinces plan to build nuclear power stations and have conducted site selection. Advanced planning has been made in Guandong, Liaoning and Zhejiangprov**inces.**

There have been no known systematic studies of health effects of the Academy. There have been periodic stories about mysterious and unnatural deaths around Lake Kokonor. But they have been not specific enough. Some of these reports came from a Tibetan physician who lived in the area. In 1984, a Tibetan doctor, Dr. Tashi Dolma was sent to the Academy to take a blood sample survey which was part of an effort to prove that Tibetans were genetically and inextricably linked to the Chineee. Dr. Tashi Dolma and other physicians sampled over 2,000 people from three counties. But the samples were never analysed for effects of radiation. In two villages, Reshui and Gansihe, Tibetans reported to the medical team that there were strange diseases in their villages. These villages were closest to the Ninth Academy. But the team was not allowed to pursue these reports further. Dr. Tashi Dolma also worked in a hospital in Chabcha (Gonghe in Chinese) in Hainan Tibetan Autonomous Prefecture directly south of the Ninth Academy. There, Dr. Tashi treated Tibetan nomads whose sheep graced near the Academy. The children were found developing a cancer that caused their white blood cell count to rise uncontrollably. Seven of the children , aged 7-14, died during the five years she was at the hospital. A doctor from Pittsburgh, whom the I CT has been unable to locate, reportedly came to Chabcha to conduct research at the hospital and told Dr. Tashi that these symptoms were similar to cancers which followed the bombing of Hiroshima and Nagasaki. Tibetans interviewed in the area in September 1992, said that meat from animals in the valley surrounding the Ninth Academy was banned by authorities from stores. "Everyone was told not to eat the meat from there, but not told why." One parson complained that the meat was much more effectively kept away from the Chinese communities in Qinghai, but impoverished Tibetan sometimes ate the meat out of ignorance or necessity. It is unlikely that nuclear waste from China or abroad would be disposed far from the railway line that leads west into Amdo. That railway line crosses headwaters of the Yellow River - but not the river itself- at the Ninth Academy and elsewhere.

The only other potentially dangerous activity likely to be in the headwaters of the other rivers is uranium mining which does not produce the high-level waste which poses significant threats to populations far downstream. Another potential threat would have been the nuclear plant that was planned for Lhasa on the headwaters of the Brahmaputra, which would have produced high-level waste. But its construction has been cancelled, at least for the time being.

Unsafe waste disposal practices from the Ninth Academy threatens health in Xining, located approximately 70 miles downstream and inhabited by more than 700.000 people. The section of the Yellow River downstream of the Ninth Academy has been documented as containing huge quantities • approximately 100 tons - of liquid mercury. The mercury is believed to come from the nuclear facilities located further downstream at Lanzhou, Gansu Province, which lies at the base of the Tibetan Plateau. Liquid mercury is one of the principal waste products of military nuclear weapons development. During the 1960's and early 70's, China dumped enormous amounts of liquid mercury directly into the rivers. Mercury and other highly toxic solvents are commonly mixed with high-level military waste resulting from plutonium production. Even the Chinese official records on nuclear development admit that their attempts to dispose of mercury waste from nuclear military development "were rather poor". River section in Gansu, directly downstream from the Tibetan Plateau, also contains phenol and arsenic more than 11 times the permissible standards.

Waste in Lake Kokonor

In the former Soviet Union, disposing of nuclear waste was often done by dumping it into the nearest water-body. This practice was partially due to the frantic nuclear preparation for the Cold War. The pace was equally, if not more frantic in China. As a result, many nuclear experts fear that China engaged in some of the most dangerous disposal methods such as dumping waste directly into the rivers and lakes. This waste management philosophy and practice -"dilution is the solution to pollution"- is still widespread in China.

Lake Kokonor (Qunghai Hu in Chinese) , the largest salt water lake in Tibet, is located 10 miles east of the Ninth Academy. A railway line leads directly from the plant to the lake and stops at the water's edge and could have been designed by the Soviet advisors who helped build the facility. The line may have been used to dispose barrels of waste. Experts speculate that this rail line may have been used to dispose radioactive waste when the waters of the lake was higher. Galen Rowell, an eminent Himalayan photographer and naturalist, remembers seeing this rail line in 1980, along with unusually heavy truck traffic in the area, neither of which he could explain at that time.

The ICT received numerous reports of top-secret military manoeuvres on Lake Kokonor in the early 1970s. One came from a Chinese man whose father worker as a nuclear scientist and was living in Lanzhou in the 1970's. According to this man, there was an accident involving nuclear pollution of Lake Kokonor in 1974. Fishing was banned temporarily and at least the scientific community in Lanzhou refrained from eating fish from the lake for many years as a result of the accident.

Public Opposition

The security concerns for the Ninth Academy included rebellions by Tibetans against direct Chinese rule. Tibetans have a long history of protest against Chinese domination in Qinghai. Qinghai was run by a Muslim warlord, Ma Bufang, during the first half of the Century and was independent of any Chinese rule. Construction of the Ninth Academy displaced some villagers, nomads and monks. Though there is no record of fighting and resistance around Haiyen, some of the fiercest resistance has come from the Golok nomads who live south of the Lake Kokonor. Maps show that there were several Buddhist monasteries in the vicinity which were destroyed and have never been rebuilt, probably due to their proximity to the sensitive facility. From the orientation of its fortifications, it appears that the facility was prepared for an attack from the south of the Lake. Now one finds abandoned trenches, bunkers and barbed wire.

China has, sometimes, simply created a separate administrative district to side-step a local government that may pose problems, or established a friendly local government. Both these tactics have been used in Tibet. For example, to facilitate the construction of the Ninth Academy, the authorities "set up" a friendly local government. Parcels of land for nuclear missiles sites were also removed from the jurisdiction of prefectures, made into their own administrative unit and controlled directly by Beijing.

K.Krpa

Mescalero Apache Tribe Votes Down MRS

In a vote that shocked the nuclear power industry, the Mescalero Apache tribe January 31 decisively rejected a plan to build a radioactive waste dump on their land. The plan, promoted by nuclear utilities and tribal leaders, would have established a private "monitored, retrievable storage" facility for high-level nuclear waste on the tribe's New Mexico land. The final vote was 490-363, or 58%-42%, against the proposal. The question drew a record voter turn-out for the tribe.

The size of the margin against the dump, and the record turn-out, appeared to leave little option for the 33 nuclear utilities which had hoped to set up a private nuclear waste dump, or at least create a viable radioactive waste alternative if current efforts fail to force US taxpayers to take the waste by 1998. Indeed, the day after the vote, Northern States Power (NSP) lobbyists already were at work in the Minnesota legislature seeking new concessions to allow the utility's nuclear reactors to operate beyond 2002. Northern States Power was a key mover in the effort to site a dump on the Mescalero land Last year, the Minnesota legislature narrowly approved construction of a limited number of dry cask storage units for NSFs Prairie Island reactors, while setting up a method for the utility to switch to renewable energy sources and close its reactors.

The industry's Nuclear Energy Institute appeared to concede further defeat on the private MRS concept, saying that the vote made it imperative for Congress to act this session to require the Department of Energy to build an "interim" nuclear waste storage facility by 1998. Senator Bennett Johnston (D-La) has introduced S.167, which would require construction of such a dump at Yucca Mountain, Nevada.

The Mescalero's clear rejection of the MRS appeared to take the industry by surprise. The project had the support of the tribal leader, Wendell Chino, and the tribal council. But in the days before the vote, opposition efforts led by Humans Against Nuclear Dumping, a Mescalero-based group, and Joe Geronimo, grandson of the legendary Apache leader, began to turn the tide. Nearly every Mescalero household received factsheets prepared by Nuclear Information Resource Service, and heard donated radio ads - in Apache -from Geronimo.

The size of the anti-dump vote appeared to preclude concerns that Chino and the tribal council might attempt to force the MRS on the tribe anyway. Indeed, Chino now may face a battle over tribal leadership. However, there were rumours that Chino might press for a second vote, with substantially increased funding from nuclear utilities. Unconfirmed reports indicated that Mescaleros were told that they could receive $2,000 for switching their votes in favour of the dump.

The Nuclear Monitor February 13, 1995.

HIGH COURT ORDER
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Not Only Through Radiation

"What lf :A Case Study of Kaiga

Normally when one thinks of a nuclear accident or a safety hazard during its routine operations, what immediately comes to mind are only the radiation hazards. Compared to these, the non radiation ones may even seem trivial. On the one hand, the first reaction of the nuclear establishment in any accident is that it has no radiation impact! Even the Chernobyl accident has been dismissed by Dr. Raja Raman na (the erstwhile chairman of the Department of Atomic Energy) as a "curious fire accident". There are several experts in the Health Physics Division of Bhabha Atomic Research Centre who are willing to assure us that the genetic damage and deformities at Rawatbhata are due entirely to non radiation causes. Also our most recent nuclear accidents, the fire at Narora, the flooding of Kakrapar and the crash of the Kaiga dome, have opened up the possibilities of genuinely non radiational but nonetheless serious hazards arising from our nuclear power stations. This perhaps is a unique feature of the Indian nuclear programme.

However, the fundamental reason for studying the non radiational accidents is that they raise disturbing, What if questions. What if the Narora fire had spread another 50 feet, with all the safety systems inoperative? What if the Kakrapar flooding had occurred when the reactor was running? What if the Kaiga Containment had collapsed onto a critical core and damaged it? One can also use the non radioactive accident as a pointer to the safety culture in the nuclear establishment. Analysis of the causes and the way such accidents are handled, provide us with valuable insights into how real, radioactive accidents will be managed by the establishment and the level of public safety that one may expect during such emergencies.

The Unthinkable Crash

On Friday, the 13th of May last year, the inner containment dome of the first reactor at Kaiga caved in for no immediately discernible reason. Reports said that concrete slabs weighing several tens of thousands of tonnes came crashing down from a height of about 40 meters, the height of a 12 storied building, Normally the containments of nuclear power plants are built strong and are built to last. They are supposed to withstand not only the intense radiation from within but also natural disasters like hurricanes and severe rain. They should not be breached even in case of a massive earthquake of the magnitude of 6.5 or a bomber attack by air. In the last earthquake at Kobe, Japan, there were 11 nuclear reactors in the quake hit area. All of them survived, shutting down safely. (However, none were near the epicentre of the crash. If the epicentre had been a hundred miles to the north where most of the reactors are located it is unlikely that the reactors would have survived, since the earthquake produced accelerations which were for in excess of design basis of the reactors,—Editor) But in India, we have containment structures which do not seem to withstand their own weight! The very strict requirements of integrity are necessary because, despite claims of Defence in Depth, containment is the sole barrier between the radioactive core and the environment. The collapse of a containment dome in any reactor at any stage is simply unthinkable.

Implications

To understand the true implications of the Kaiga accident, one has to ask what would happen if the containment of a working reactor comes crashing down. The worst possible accident scenario in a nuclear power plant is a core out of control coupled with breached containment. In the case of Chernobyl, the reactor core went out of control and blew the containment, whereas in Kaiga the sequence would be in reverse, but the end result would be the same. The falling debris of the dome would damage the core, the coolant pipes, and many of the safety systems as well. With cooling and safety systems inoperative, the core will suffer a loss of coolant accident. With the containment already breached, the result would be a nuclear disaster of the same magnitude as Chernobyl.

Various possibilities come to mind when one looks for the causes of the accident. Kaiga after all is a Government building and no one needs two guesses as to why Government buildings collapse during construction. On the one hand NPC claims to have procured the best quality construction materials, and on the other, the people of Karwar claim that the local markets are flush with huge quantities of the same high quality cement and steel. Investigative reports have been published detailing several corrupt practices at the site, including the diversion of materials. It should be noted that the fire station building at Kaiga had also collapsed earlier.

So What if the Roof has collapsed !
The Engine is still working
Kaiga Rambharose Tra

The Official Explanation

The official explanation of the dome crash is equally damning. It has been admitted that the design of the dome was changed at the site. But the serious safety questions raised by this admission have not been answered. Who decided to change the design? Were they authorised to do it? More important, were they competent? What kind of safety culture prevails in the nuclear establishment where something as critical as the containment design can be changed by incompetent and unauthorised persons? Was the AERB clearance taken for the design changes or was it bypassed altogether? What is the value of the claims made both by AERB and the NPC that all major design aspects of the power station are audited by the AERB have not been ignored by the NPC?

Nucteocratic Mindset

It is also important for us to analyse the response of the nuclear establishment. The reactions from its senior officials can be grouped into several attitudinal categories.

The first response was to hush it up. The injured were immediately taken out of the reactor building which was sealed. Till today the death toll has not been disclosed. Normally at least a hundred workers are inside the dome at any given time. We have been told that (by God's grace, no less) the dome crashed during the lunch hour. Lunch break at 11.45 AM at an Indian construction site strikes one as an innovative idea.

The Real Surprise

There are two committees appointed separately by the NPC and AERB to investigate the accident with an assurance that they would submit their reports within three months. No one is certain as to when they will do so. Recently Dr. Gopalakrishnan, Chairman AERB has made the remarkable admission that the delay is due to non availability of important documents from NPC. This is not surprising. The real surprise is that AERB is actually insisting on documents from NPC. But no matter when released, one thing we can be certain of - both of them will be suppressed. There is a saying: He who has a secret to keep, keeps it a secret that he has a secret to keep! Therefore, even the fact that there is an official report on the accident will be suppressed so that no one would think of asking for it!

The Veil of Darkness

At no point of time did the NPC take the local administration into confidence. The Karwar District authorities were informed of the accident only late at night. The injured were kept incommunicado in the hospital so that they did not talk. Till today no group of citizens or the local administration has been permitted to see the damage.

Allaying Public Pears

When the news broke out anyway, there were attempts to trivialise it. This comes under the favourite pastime of the nuclear establishment viz., "allaying fears in certain sections". The crash of the dome was described in the officialese as "certain sections of the containment getting delaminated". When repeatedly asked about such an accident in a working reactor, some of the most bizarre explanations have been offered for the accident. A few samples are

a. Not even a spec of cement would have got into the core.

b. So what? If the roof of your car gets blown away wont the engine be still working?

c. What if one dome collapses? We have another dome around it!

Given the seriousness of the accident such frivolity can only be described as irresponsible and in extremely bad taste.

Serious Repercussions

In a more sophisticated attempt to gloss over the failure, it was stated that the dome was undergoing prestressing at the time of collapse. In reality the dome construction was over nearly four months earlier. The NPC's desperation in the matter is indicated by the fact that even the Prime Minister has been fed with this piece of misinformation.

In a case of a real accident, such bureaucratic attitudes can only lead to serious repercussions for the safety of the general public. While openness, accountability and transparency are desirable at all times, they are of critical importance in the event of a massive nuclear disaster where large populations have to be evacuated in a short time. It also demands perfect co-ordination with the local administration and other agencies. But if the ostrich like attitude displayed during the Kaiga dome collapse is any indication, the nuclear establishment is more likely to be busy denying or trivialising the seriousness of the accident, jeopardising the life of thousands.

Too Hot to Handle

Kaiga is also unique in posing non radiation hazards even without an accident. One such hazard which is not generally understood is the thermal pollution. Much has been said about the folly of setting up a reactor complex in the middle of a tropical rainforest. This has been countered by the nuclear establishment with claims of minimal damage to the ecosystem. Figures like "only 125 hectares of forest will be lost because of the project" have been touted but have already been proved hollow.

A nuclear power plant is essentially a boiler with highly radioactive nuclear fuel which generates tremendous amounts of heat. The heat is used for boiling water which in turn runs a turbine. In this process, only about one third of the heat is converted to electricity. Thus for every unit of electricity is generated, two units of waste heat is also put out which must be dissipated in the environment. A 235MWe reactor at Kaiga produces about 470,000 units (KWh) of heat every hour which will be released into the surrounding rainforest. This is equivalent to the heat required to heat 4 million litres of ice cold water to its boiling point.

The environmentalists were assured earlier that there will not be any cooling towers in Kaiga spewing out enormous quantities of steam into the valley. This decision too has been reversed. If the planned complex of six reactors is actually carried out in Kaiga then we would be releasing the heat equivalent of 24 million litres of boiling water every hour into the rainforest. The nuclear establishment in India is blissfully unaware of any tropical environmental issues and has done no studies on the hazards of thermal pollution from its plants in Kaiga. The sloppily done NEERI report has also ignored this important point. Tropical flora and fauna are very sensitive to the heat content of their environment. The impact of such massive heat release will be a total destruction of the ecosystem. The only redeeming aspect is that because of poor siting and management, the Kaiga reactors will be shut down more that 50% of the time and consequently the heat pollution will be less to that extent.

Transmission Line Vandalism

Another non radiation hazard to the Kaiga reactor is the deforestation being carried out in the name of transmission lines. Through a series of multiple sub contracts the clearing of forests and encroachment of private properties for laying transmission lines is taking place in Karwar district. There is widespread resentment in the region against this vandalism and people are organising themselves to launch an agitation.

In conclusion one can say that non radiation related hazards of nuclear power plants are real and significant. The analysis of the Kaiga dome collapse reveals the absence of accountability and lack of safety culture among the nuclear agencies in India. The implications of such complacent attitudes during a major accident should be a matter of grave concern. Nuclear power plants also pose serious thermal pollution problems which will lead to a total destruction to the sensitive ecosystem in Kaiga.

Sanjay Havanur

Some Generic Safety Issues of Indian PHWR Stations

An article from Dr. Gopalakrishnan, the Chair of the Atomic Energy Regulatory Board seems to have become a regular feature of Anumukti. The following are some excerpts from a speech he recently made at a seminar on Nuclear Power and the Public Safety organised by INTACH in Delhi. They detail some of the safety issues that are common to all Indian nuclear power plants with the exception of Tarapur.

Inservice Inspection of Reactor Coolant Channels.

Recognising the possibility of failure due to contact between the pressure tube (PT and the calandria tube (CT), as a result of garter spring movement, Atomic Energy Regulatory Board (AERB) has directed the Pressurised Heavy Water Reactor stations to carry out inservice inspection (ISI) of coolant channels on an urgent basis. The following criteria have been adopted for the prioritised selection of channels for inspection:

a) channels having history of failed fuel bundles

b) the high-flow and high-power channels in the central zone

c) channels near adjuster rods, and

d) channels which exhibit high creep deformation.

Based on the above considerations, the Rajasthan and Madras atomic power stations have carried out ISI of 16 & 14 channels respectively, using an indigenous tool (BARCIS) specifically developed for this purpose. The results reviewed and suspected channels were defuelled and quarantined. MAPS was asked to carry out chemical decontamination of the Primary Heat Transport system before undertaking the next campaign of ISI of MAPS-1 coolant channels. This has also been done and the results are presently under review.

End-shields of earlier generation PHWRs.

The two units of RAPS and the first unit of MAPS have their End Shields made of 3.5% nickel steel. Contrary to the original design expectation, it was found that this material gets embrittled at a much faster rate. However, the material of end-shields from MAPS-2 onwards has been changed to austenitic stainless steel. Feasibility studies are underway for replacement of the embrittled end shield. In the meantime, in view of the leaky south end shield of RAPS-1, the regulatory body has restricted RAPS-1 operation to 50% Full Power.

RAPS-1 Calandria Over Pressure Relief Device (OPRD):

During the early seventies, OPRD of the Douglas Point Nuclear Power Plant in Canada had developed a leak. By the time this (act came to be known, RAPS-1, whose design is similar to that of the Douglas Point NPP, had already started operating and the OPRD became inaccessible. For subsequent NPP's the OPRD has been located in accessible areas, so that appropriate maintenance and inspection can be carried out without difficulty.

As at Douglas Point, the nickel gasket employed in the OPRD of RAPS-1 also developed a leak, forcing the unit to be shutdown. As an interim measure, certain operational stipulations such as imposition of a modified dump tank pressure control and ensuring the availability of calandria vault dryers, have been made. Meanwhile, an action plan for repair of the leaky gasket is being pursued,

Damaged inlet manifolds of MAPS Units

During 1989, the moderator inlet manifolds situated inside the calandries in both units of the Madras Atomic Power Station (MAPS) suffered damage, forcing shutdown. Detailed evaluation of the extent of damage was carried out.

NPC approached AERB with a proposal to modify the flow path in the moderator circuit and operate the units at a reduced power level. This proposal consisted of cutting and balancing the existing 8" size calandria inlet line and rerouting the outlet line to convert it as an inlet line. Moderator pumps then take auction only from the dump tank. Fast pump-up logic would be kept inhibited, while the maximum moderator outlet temperature at heat exchanger outlet would be restricted to 65 degrees Centigrade.

After review of the proposal and taking into account the modified stress contours and thermal hydraulic performance, permission was accorded for operation of both units of MAPS in the modified mode at 75% Full Power as an interim measure.

Meanwhile, studies are being carried out with the help of the Indian Institute of Technology (IIT), Bombay to determine the flow pattern of moderator in the modified mode and the consequent thermal effects on the rolled joints. The determination of the heat transfer coefficient in the flow mode, estimate of the average tube sheet temperature, and determination of the pull-out strength of rolled joints at the elevated temperatures etc. will form part of these studies.

A Gopalakrishnan and
S.V.Kumar
Atomic Energy Regulatory Board

The Pileup at Pickering

A serious nuclear accident on December 10 caused the emergency core of coolant injection (ECCI) system at a Canadian nuclear reactor on the shore of Lake Ontario to activate for the first time in the province's 23-year history of CANDU reactor operations.

This last-resort emergency, injected cooling water to avert core damage and possible meltdown at Ontario Hydro's Pickering Nuclear Generating Station, located 20 miles east of Toronto. The accident raises the question of whether unknown design flaws exist in the Canadian design CANDU reactor, and the possibility that nuclear safety margins are decreasing as the reactors age, increasing the risk of a major accident.

The unprecedented accident and the resulting heavy water spill at one of the facility's eight nuclear reactors also involved an off-site radiation release. Regulatory concerns about the accident and public concerns over nuclear safety at Pickering have delayed the relicensing of the antiquated station by Canada's Atomic Energy Control Board (AECB).

Pickering town councillor, Maurice Brenner is reported to believe that Ontario Hydro failed to provide "open and honest communications" with the town concerning the accident. The *Tbronto Star* newspaper is asking whether the accident caused damage to the reactor's nuclear fuel.

The accident at the 500 MW unit 2 started when a fault caused a pressure relief valve on the primary heat transport system to open, There are four pressure relief valves in the heat-transport system and they are designed as a "fail-safe" mechanism. They are supposed to pop open whenever the pressure in the reactor—either from excessive heat or from high volumes of water — builds up. Once the valves are open, the heavy water flows into the bleed condenser tank, where it is collected and later recycled. However, the pressure valve malfunctioned when an air line that keeps the valves closed failed.

As the water rose in the bleed condenser tank, the pressure dropped in the heat-transport system and tripped a sensor that stopped the turbines. When the turbines stopped **running, the system backed up. Pressure increased in the heat-transport system, a situation that the plants fail-safe mechanisms are designed to handle.**

However, in this case, a pipe in the bleed condenser broke dumping 130 tonnes of tritium-contaminated heavy water to the boiler room floor. This accident sequence is similar to that which caused the Three Mile Island accident, where a preesuriser performs similar functions to the bleed condenser, normally maintaining the balance and pressure of

A Pragmatic Perspective

"Area residents acknowledged that it was frightening to live so close to a nuclear reactor, but maintained a pragmatic perspective:

'If there's going to be a major nuclear disaster, we'd prefer to be close by and wiped out immediately rather than suffering and dying three days later from radiation sickness," said Sally Charbonneau, a mother of two who lives less than two kilometers from the reactor.

From the Toronto Globe and Mail

water in the primary heat transport system.

The ECCI system then automatically activated, dumping cold water into the heat transport system. For four and one half hours it kept the reactor fuel from overheating and the reactor from a severe core damage accident Six employees were operating the plant at the time of the leak. They were not moved out Another 100 were at the plant, but not in the area of the leak.

Pickering director Pierre Charleboifl said the incident "demonstrated the integrity of the safety systems and the ability of the staff to respond."

However, the community watchdog group, Durham Nuclear Awareness, which has the support of Toronto City Council, municipalities in the Pickering area, and several members of the Canadian parliament, urged the AECB to order a full investigation into safety at Pickering. The loss of coolant accident should serve to emphasise ongoing problems that would benefit from a public review by the AECB."

Durham Nuclear Awareness wants Hydro's nuclear power plants mothballed, and says it has new evidence that Pickering sits in an area that is threatened by earthquakes.

Norm Rubin of the Toronto-based public interest group Energy Probe says The accident developed in a way that compromised the vaunted 'defence in depth'principle of nuclear safety, because one fault led to another." He points out that the reactor shutdown systems of the first four Pickering reactors (Pickering A, one of which experienced the accident, are the least capable of Hydro's reactors. Also the Emergency Core Cooling Injection system was not part of the original reactor design, and was retrofitted.

The Pickering nuclear accident occurred while Ontario Hydro and federal GANDU seller, Atomic Energy of Canada Ltd. are promoting a plan for the US Department of Energy to fuel CANDU reactors at the Bruce nuclear power complex (north-west of Toronto on the shore of Lake Huron) with pluioniuro freed from the US atomic arsenal mixed with the reactor's natural uranium fuel. The proposal is deplored by Canadian environmentalists as unsafe and unsound, would leave the country with increased nuclear waste, and blur the line between civilian and military use of nuclear materials. Additionally, the Bruce reactors are already facing premature shutdowns for technical and economic reasons, with the first reactor of eight at the Bruce complex slated for permanent shutdown in 1996.

Based on reports by David Bright & Stephen Salaff for industry publications and by Ameer Nasrulla for the Toronto Glob and Mail*

Editor's Note: The accident at Pickering is of special relevance to us in India since the much touted "Pressurised Heavy Water Reactors of our own design" are in reality copies of Canadian reactors. The Rawatbhata and Madras reactors are based on the Douglas Point reactor (which was a precursor to Pickering) whereas the later reactors at Narora, Kakrapar and Kaiga are "improvements" on that design. There are very serious implications of the accident at Pickering for us. On a world-wide scale CANDU reactors are few in number and there is comparatively less operating experience. Thus, their safety features are not that well understood and they are quite capable of springing unpleasant surprises.

As the reactor population ages, it is more prone to have accidents. Old reactors in India like the one at Rawatbhata have not been retrofitted to have newer safety systems like ECCI as was done at Pickering. Thus, a similar sequence of events at Rawatbhata could have led to a bigger disaster. While newer reactors like Kakrapar-1 do have an ECCI system, it has not been properly tested, so its behaviour in actual accident conditions is a matter of conjecture and prayer. Editor's Note: The accident at Pickering is of special relevance

Poor Taste and Poorer History

The US Postal Service has announced a commemorative stamp marking the atomic bombings of Hiroshima and Nagasaki

The stamp, which marks the 60-year anniversary of the ending of World War II, shows a mushroom cloud and carries the caption, "Atomic bombs hasten war end."

Besides being in poor taste, the stamp is also poor history. Nearly 60 years ago, the "Big WAR" ended with the "Big Lie"; that the bombings were necessary to force Japan's surrender, thereby avoiding a bloody, costly invasion.

While the US government kept the record about the decision to bomb secret for decades, enough material is now declassified to debunk the "Big Lie."

The Japanese communications code was cracked early in the war. So when Japan was seeking Soviet diplomatic help in securing acceptable terms of surrender in June and July 1945, the United States knew it.

President Truman's journal, discovered in 1979, reveals his knowledge of Emperor Hirohito's early peace overtures through the Soviets. Towards the end, moreover, Japan's desperate state forced her to make peace overtures directly to the United States.

Japan's desperation was partly the result of a massive US fire-bombing campaign aimed at her cities. The naval and aerial blockades of the island nation were tight; food was short and raw materials were scarce. Bombing, blockade and an unsuccessful Japanese attempt at industrial dispersion had significantly reduced their production capacity.

The official US Strategic Bombing Survey reported, "Based on a detailed investigation... and supported by the testimony of the surviving Japanese leaders involved, it is the Survey's opinion that certainly prior to 31 December 1945, and in all probability prior to 1 November 1945, Japan would have surrendered even if the atomic bombs had not been dropped..."

The official explanations that the bombings were needed to save American lives also contradict a secret study conducted by the War Department's Operation Division in early 1946. Discovered in the National Archives in 1989, the study plainly stated that a full-scale invasion was no longer necessary by the summer of 1945 and that it would have never occurred in any event. While these reports were written with hindsight, the authors of the first report stressed to Truman in June that an invasion was not needed. The met is, the President had accurate foresight aplenty.

We now know that he received similar advise from nearly all his top military advisors, including Gen. Hap Arnold and Gen. Curtis LeMay, certainly no dove. Eisenhower told Secretary of War Stimson, "Japan was already defeated and that dropping the bomb was absolutely unnecessary." According to Gen. Omar Bradely, Eisenhower also conveyed this to Truman in a June 20 meeting, challenging the President on his stated intention to use the new weapon.

The primary reason for the bombings appears to have been the desire of Truman and his advisors to keep the Soviet Union out of the Pacific war, thereby solidifying US economic and political control in postwar Japan and Asia. As the President somewhat crassly put it, the bomb "would keep the Russians straight."

Truman postponed the Potsdam conference until July 17 so it would occur after the secret July 16 atomic test. At Potsdam, with his atomic card concealed, Truman got the Soviets to amend the agreement reached at Yalta in February. At Yalta, the Soviets agreed to enter the war with Japan three months after the surrender of Germany, which came on May 8. All agreed that the Soviets would declare war on Japan on August 8,1945. Until mid-April, the United States felt that it needed the Soviet entry to break the Japanese military. But Japan's deterioration had come so quickly the Soviet Union was no longer needed. At Potsdam, Truman got the date for the Soviet declarations of war set back a week to Aug. 15, giving him time to push the new bombs into production and delivery. Hiroshima was bombed on Aug. 6, Nagasaki on Aug. 9. As Winston Churchill observed at Potsdam on July 23, It is quite clear that the United States do not at the present time desire Russian participation in the war against Japan." A primary architect of US policy, Secretary of State James Byrnes, said he was Anxious to get the Japanese affair over with before the Russians got in." His diary reveals he was doping for time, believing that after (the) atomic bomb Japan will surrender and Russia will not get in so much on the kill, thereby being able to press claims against China."

The only nation to use atomic weaponry in warfare has a peculiar responsibility as the 50th anniversary year of the bombings approach. Many Americans are already repeating, perhaps unknowingly, the old lie that without the bombings more American and Japanese lives would have been lost than the 200,000 Japanese killed in the ongoing tallies of the bombings.

But the historical record clearly shows - for those Americans patriotic enough to embrace it - that not even these Japanese's deaths were necessary. As the people of the old Soviet Block have shown us in recent years, confronting national falsehoods is never easy. Still we must do it. Our commemorations ought to be solemn, sensitive and above all truthful. We owe the Vaporised dead, some of whose shadows are burnt into the concrete of Hiroshima, nothing less.

Patrick G. *Coy*
The Post Standard, December 7,1994.

Later news-reports said that the proposal to issue the stamp had been dropped because of strong public opposition—Editor

Seminar on Nuclear Energy and Public Safety

On February 3 and 4,1995, Indian National Trust for Art and Cultural Heritage (INTACH) organised at the India International Centre in Delhi a seminar on "Nuclear Energy and Public Safety" in its series on 'Science and Public Policy." Originally, high officials of the nuclear establishment had agreed to attend the seminar, but at the last moment thought discretion to be the better part of valour. However, representatives from the Atomic Energy Regulatory Board were present as were two nominees from the Department of Atomic Energy (DAE). Also present were Dr. M. R. Srinivasan, the erstwhile chairman of DAE, and Mr. S. K. Chatterjee, the recently retired Managing Director of the Nuclear Power Corporation. A serious lacunae of the seminar was the scarcity of 'neutral' observers. The seminar thus became more a harangue of the converted to the unconvertibles. Despite this inherent limitation, the seminar did manage to reach a consensus on the following points, and thus serve a useful purpose. The person most responsible for guiding this disparate group of individuals towards a conclusion was Dr. Vinod Gaur.

Resolutions and Recommendations

Discussions and presentations made at the seminar clearly showed that a divergence of perceptions and understanding of some of the crucial public safety issues of nuclear power, clearly exists between scientists of BARC and the AERB on the one hand and other independent scientists working in the public domain, on the other. These differences could be substantially bridged, if appropriate steps are taken to ensure transparency of related information systems and the scientific vigour of the investigations made and their analysis. In order to bridge these gape with genuine understanding necessary to evoke a constructive criticism and public response, the seminar accordingly makes the following recommendations and earnestly appeals to the Government to implement these forthwith.

1. That in the interest of instilling public confidence in all matters relating to public safety issues of nuclear energy, the Government should restructure the Atomic Energy Regulatory Board (AERB) as a truly independent agency outside the control of the Atomic Energy Commission. Further, the restructured AERB be appropriately furnished with requisite technical facilities, expertise and resources to enable it to fulfil its mandate to the nation.

2. That the Government should also initiate necessary steps to develop expertise in nuclear engineering in higher technological institutes.

3. That the Government may take appropriate steps forthwith to introduce a consultative mechanism through open public hearing at all crucial stages of setting up and operating nuclear installations.

4. That the Government may promote joint discussion meetinp, between officers of the Atomic Energy Establishments and the public and voluntary organisations to provide a forum for promoting mutual understanding of the diverse aspects of complex safety related issues.

5. That in the interest of promoting accountability and constructive public response, the AEC and AERB should hence forth make publicly available all data and information relating to safety, in particular, the technical report of Site Investigations, Environmental Impact Assessment, Safety Analysis, Emergency Preparedness Plans, Compilation of Operational Data, Analysis of Unusual Occurrences and Accident Analysis Reports.

   Further the report of Investigations of the Kaiga dome failure, ordered by the AERB, be released for public information.

6. That in the interest of allaying public fears of the long-term hazards associated with the decommissioning and retrofitting of ageing and impaired nuclear power plants and of waste disposal, the Government should bring out detailed scientific documents giving information on the scientific approaches and plans of inspection and repairs of the ageing Tarapur plants, re-tubing of the impaired Rajas than Plants, as well as long-term disposal of radioactive wastes.

7. That the AERB should seriously consider involving NGOs in the scientifically designed investigations of important issues of public safety as well as in the important task of creating an informed opinion amongst communities living in the neighbourhood of nuclear installations,

8. The Atomic Energy Regulatory Board and the AEC should make effective use of technological expertise and advice available abroad for timely resolution of safety-related issues, in addition to relying upon those available in the country.

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The Highest Duty

l do not ask for mercy. I do not plead any extenuating act. lam here, therefore, to invite and cheerfully submittothe highest penalty that can be inflicted upon me for what in law is a deliberate crime, and what appears to me to be the highest duty of a citizen.

Mohandas K Gandhi (Statement in the Great Trial of 1922)

Your Honour, the Douglas County Jail is not a comfortable place to be .... especially for someone of my age and disability. I am 68 years old and blind. 1 can no longer read books or magazines, or newspapers or even the mail that comes to me from friends and family. I can no longer play the chess games and card games that help to while away the days and weeks and months in jail.

But I did not come to Omaha to seek comfort. I did not come to Offutt Air Force Base and to jail in search of relief from pain and suffering that is largely of my making. And I have not come to this courtroom today to negotiate a return to the comforts of home.

I came to make a point I came here to say with my body what I have been saying with words for almost half a century. I came here to alert this courtroom to our government's preparations for waging nuclear war.

I could have gone to any district in the United States to make the point. Sadly, our government's design, manufacture, testing, transportation, deployment, command and control of nuclear weapons permeates every part of our land. But I chose to come here because Offut Air Force Base is headquarters of the US .Strategic Nuclear Command, which controls the targeting and launching of many thousands of nuclear warheads, some more than 100 times more powerful than the bomb that destroyed Hiroshima. And I chose to come here now because, contrary to public opinion and despite the end of the cold war, our government has not relinquished one iota of its capacity for waging nuclear war. and it has no intention of doing so.

Under international law it is a crime to point weapons of mass destruction at defenceless cities. Under international law, it is the duty of every citizen to do everything possible to prevent such crimes. Many international laws are also the law of our land, having been ratified as treaties by the Senate of the United States. I have done my best to uphold the law. Now it is the responsibility of this court.

Your honour, you have seen the evidence in this case and rendered your verdict of guilty. So be it If this is the time for me to express regret and beg for mercy, I do so readily.

I regret that I did not succeed in penetrating the legal thicket of this case to apprise the court sufficiently of the clear and present danger in this district I regret that, like the good judges who looked the other way in Nazi Germany while Hitler was preparing his holocaust, you could not bring yourself to take appropriate action while there is still time, I regret that you did not seize this opportunity to declare StratCom a global public nuisance, a threat to the world, a crime against humanity.

I beg for mercy - not for myself, but for the many millions who may some day perish under the mushroom clouds of nuclear weapons launched, in effect, from this very district I pray for mercy for the children, the old and the sick, the disadvantaged and the disabled who suffer daily , even in the absence of nuclear war, because public funds that should be spent for them, rather than siphoned into the coffers of corporations and military services that profit from preparations for nuclear war. And I beg for mercy for the earth, suffocating and dying bit by bit under its mounting burden of permanent, deadly, radioactive poison.

Finally, Your Honour, I beg you to reconsider your verdict. Not for my sake, but for the sake of all I have mentioned. If you cannot do this, then I welcome whatever prison term you propose. Please know that as a matter of conscience , I cannot accept any probation that would keep me away from Offutt, or any other military or nuclear installation. On the other hand, if you find that you cannot in good conscience enforce a law that exonerates StratCom while criminalizing me, I invite you to come down from your bench and join me and my friends at the gates of Offutt Air Force Base. We need your help. Thank you.

Sam Day from The Inside Word

From *the Editor's Desk*

Nuclear Non-Proliferation Treaty (NPT) has been in the news lately. We have previously stated the Anumukti's position on this treaty in clear terms. We remain unambiguously opposed to India or anybody else for that matter, signing this treaty since we feel that no self-respecting person or nation can sign the treaty. The treaty seeks to perpetuate injustice in international relations and rewards those who have wilfully harmed their own unsuspecting citizens besides all other beings. The nuclear haves have no intention even now of foregoing the power acquired through possession of these weapons and are in fact in the process of 'refining' these and other newer tools of death. Even the blood money that these nations are prepared to pay to other nations for observing nuclear celibacy is paid *in* the false coin of 'peaceful nuclear technology'. A bad bargain for all concerned.

However, our opposition to the NPT does not in any way imply support for those in India who want to ape the wicked and make the bomb. In this issue we have a number of articles from Sam Day—a previous editor of Bulletin of Atomic Scientists who continues to oppose his country's nuclear madness not only through words but by laying his body on the line. Some day I hope I shall have the same courage.

Survey cit *Kakrapar:* Volunteers Needed

From May 20th onwards, we intend to do a health survey of people living in the vicinity of Kakrapar Atomic Power Station. The plant has been in operation for just two years. A team from South Gujarat University at Surat had done a base-line health survey of the population. This survey had been funded by the Department of Atomic Energy and has received a lot of co-operation from the nuclear authorities. The findings of the survey have yet not been published. There is a rumour that an interim report has been submitted to nuclear authorities, but the public has no access to it

We strongly feel that information regarding their own health and surroundings is the public's right. The main purpose of our survey would be to restore this right to people around Kakrapar. We intend to publish pur findings as soon as the analysis is over, hopefully before the end of this year.

A training camp for volunteers would be held in Vedchhi from May 20 to May 23, following which everyone would proceed to do the survey. Amongst the volunteers, an ability to speak in Gujarati or Choudhry or Gamit would be a great asset, although we also need people who can help with computer data entry.

Wrong Turns At Every Crossroad

NPT: A Northern Antinuclear Perspective

In the half century since a bomb of unimaginable fury ushered in the atomic age, three events stand out as pivotal in the long and losing struggle to prevent the scourge of nuclear war by somehow stuffing the genie back into the bottle.

In 1948, an effort to put atomic energy under international control, taking it out of the sovereign states, foundered on superpower rivalry. The US refused to relinquish its sole possession of nuclear weapons and the Soviet Union was determined to break that monopoly.

In 1963, forced to deal with a worldwide uproar over radioactive fallout from nuclear weapons testing, the nuclear governments of that time, (the US, the USSR and Britain) preserved their testing capability by agreeing to limit it to deep holes under the ground. The result was that field testing of new warheads, one of the keys to nuclear weapons development, continued unabated and the arsenals grew enormously.

In 1970, when advances in nuclear technology threatened to spread nuclear weapons throughout the industrialised world, the five nuclear weapons powers sought to stem the tide by negotiating the United Nations Non-Proliferation Treaty. The NPT bought off the "have not" states, by offering them nuclear power technology in exchange for. their pledge not to produce nuclear weapons. In turn, the "have" states promised to cut back their arsenals, leading to nuclear disarmament. Yet, despite surface appearances, the nuclear arms culture continued to flourish.

In each of these instances, human aspirations for freedom from the fear of nuclear destruction were systematically and cynically thwarted by machinations of what has become a deeply entrenched nuclear-military-industrial establishment.

Today, as in the past, the nuclear lobby is at work outflanking, confusing, and even infiltrating the forces that still place their hope in a reasoned and non-violent end to the nuclear arms era. Sadly, these corrupting influences can be seen at work in the current efforts of the "arms control" community, in support of a Comprehensive Test Ban Treaty (CBT) and a strengthened Nuclear Non-Proliferation Treaty.

Late in January, in what appeared to be a move toward final termination of nuclear weapons testing, President Clinton announced that the US would no longer hold out for an "escape clause" in the CTB now being negotiated in Geneva by the major nuclear weapons states. Since US hesitance had come to be a key stumbling block in the negotiations, the apparent policy switch paved the way for the long sought CTB.

But, as in 1963, when the nuclear states agreed to banish testing from the oceans and the atmosphere, there is a loophole that would leave the nuclear establishment free to conduct business as usual. In 1963, the loophole left the nuclear weapons laboratories to test underground. In 1995, the loophole is the sanction to continue testing *in the laboratory.*

While arms control advocates have long pinned their hopes and put congressional muscle behind closing the underground loophole, the nuclear weapons elite have been preparing a fall-back position in their laboratories at Los Alamos, New Mexico, and Livermore, California. Their success in achieving this was confirmed last fall when the US Energy Department announced plans to build a $ 1.2 billion "National Ignition Facility" at the Livermore lab.

The function of the new facility would be to simulate the unique conditions (heat, pressure, and radiation) which are necessary for the testing of newly designed nuclear war-heads and their components which are necessary for the testing of newly designed nuclear warheads and their components. Its purpose and effect is to facilitate the continued forward thrust of nuclear weapons development without the need for new field explosions that are expensive, dirty, detectable and politically burdensome.

Continued reliance on the NPT as a way of shrinking nuclear arsenals and confirming their spread also is fatally flawed. This will become even more evident when the 170 signatory states gather on April 17, to consider whether Co extend, modify, or scrap the existing 25-year old agreement

Many NPT critics will be attempting in New York to pressure the nuclear weapons states into deeper cuts by agreeing to a limited extension of the treaty. But this would only defer the unresolved issues underlying the NPT:

If the signing of the CTB leaves the loop-hole of laboratory testing for technologically advanced nuclear "have" states, why should the new treaty be taken as evidence of their intent to give up their advantage? Surely, NPT should not be extended without a ban on the testing in the laboratory as well as in the field, and without international monitoring to ensure compliance.

What about the problem of clandestine nuclear weapons production by states that refuse to sign the NPT and thereby avoid the international inspection of their nuclear facilities? Notable amongst such rogue states are India and Pakistan and Israel. Surely, NPT should not be renewed without the provision of economic and diplomatic sanctions against NPT-1 non-signatories.

What about the wisdom of continuing to promote nuclear power in the Third World as an incentive for staying away from nuclear weapons production? Iraq and North Korea, both NPT signatories, have shown how international inspectors can be hoodwinked. The leading industrial states now pushing nuclear power on the Third World have already encountered the ruinous health, environmental, and economic effects. Surely, NPT should not be further extended without a fresh assessment of the global impact of nuclear power.

Not surprisingly, the nuclear establishment in the US, having infiltrated and seduced much of the liberal arms control community, is pushing hard for a Comprehensive Test Ban Treaty - excluding laboratory testing - and for renewal of the Non-Proliferation Treaty with no strings attached. They argue now, as they did before, that this is the most we can accomplish at this time.

For those who have learned to live with the bomb, and to depend on it and profit from it, 1995 promises a renewed lease on business as usual of the kind secured in 1948,1963 and 1970. For the rest of us it could bring still another lost opportunity to usher out the atomic age short of atomic war itself.

Sam Day, in Nukewatch

NPT, A SOUTHERN PERSPECTIVE

The NPT has not been much of a success either in promoting disarmament or in promoting nuclear non-proliferation. Even while the United States and Russia have made a modest beginning in reducing their nuclear arsenals, they continue to press for an indefinite continuation of the NPT. This would allow them to maintain nuclear weapon arsenals forever.

The three other nuclear power signatories to the NPT - France , Britain and China - remain free to upgrade and modernise their nuclear weapons. And despite being signatories to the NPT, Iraq and North Korea have managed to develop their own clandestine nuclear weapons programmes.

The non-nuclear nations view the NPT as an unequal and inadequate treaty. They are justified in thinking that an indefinite extension of the NPT means an indefinite postponement of universal nuclear disarmament. As it is, the five declared nuclear powers have no time frame within which they plan to eliminate their nuclear weapons arsenals. The US does not even support Geneva negotiations for a treaty to outlaw the first use of nuclear weapons against non-nuclear states, Russia has retreated from its 1978 no-first-use pledge. China still continues to test; and of the other four who have accepted a voluntary ban on testing, it is still not clear how long France will adhere to it. and there is pressure even in the US to continue with hydro-nuclear testing or laboratory level testing.

If the important long term goal of the NPT is universal nuclear disarmament, then it is difficult to see how the non-nuclear nations can be convinced that this goal can be achieved through an indefinite and unconditional extension of the NPT.

The treaty has no teeth. It does not place reasonable obligations on the declared nuclear powers to move towards disarmament. There is no time-frame in the treaty for disarmament, no markers for progress towards that goal and no censure, sanction or punishment for failure to disarm. It is any wonder then that Article VI of the treaty, its general link with the goal of disarmament, has become a major rallying point for the non-nuclear signatories to the treaty?

Because the NPT didn't aim towards universal nuclear disarmament in a meaningful way, it was not able to bring in nations which wanted to keep their nuclear options open - although it is quite possible that even if the NPT were an equal treaty, countries like India and Israel might still have kept out of it.

The NPT is a contradictory treaty in several respects - its objective is to prevent nuclear proliferation by the Haves while prohibiting horizontal proliferation the Have Nots; it actually promotes commercial nuclear technology and materials that can be used in weapons programme; and it justifies peaceful nuclear explosions whose benefits are yet to be demonstrated but whose disastrous environmental consequences are all too apparent. There are several other inadequacies in the arrangements associated with the treaty - inefficient safeguards, the unresolved confusion between civil and military weapon and dual-use potential of nuclear technology, no clear definition of a nuclear weapon,, the dual-role of the IAEA as both a promoter and controller of nuclear technology etc. These have been discussed endlessly by experts.

No doubt the various shortcomings of the NPT can be discussed in detail to counter the arguments of those who want to extend the treaty indefinitely in its present form. The political point, however, is that from which perspective and with which goal are these shortcomings being pointed out. Is the perspective one of meaningful progress towards disarmament and non-proliferation or of merely maintaining a moral high ground while simultaneously creating a space for maintaining a nuclear option. The question is one of tendency - which way is one moving while making the right noises?

The question may have been resolved in the case of South Africa, which has dismantled its nuclear weapons and joined the NPT. It is not of much significance in the case of Argentina and Brazil because they have taken definite steps in the direction of bilateral and regional agreements on disarmament. But it assumes a special significance in the case of the undeclared of de-facto nuclear notions outside the NPT - i.e. Israel, India and Pakistan. By saying that in the Middle East the NPT alone cannot prevent local wars, Israel is only defending its undeclared nuclear status. And when India criticises the NPT as not promoting global disarmament and being discriminatory , we know only too well that these are self-serving arguments for keeping the Indian nuclear weapon option open.

Defendants of nuclear weapons in the undeclared of de-facto nuclear states are using a number of devious arguments to justify not giving up their nuclear weapons capability. The use of the racial metaphor of maintaining a balance between the white and the non-white nuclear and nuclear capable powers, the argument for achieving self-reliance and strategic autonomy through proliferation and claiming that NPT cannot resolve regional conflicts are all part of the same bag of arguments.

Here is a sample of the racial argument from an Indian strategic analyst who sees a desirable balance emerging between the first four nuclear powers - the USA, the USSR (now Russia), Britain and France and the late entrants like China, Israel, India and Pakistan. He writes: "Today we have a situation where as against the four white nuclear weapon nations there are four non-white nuclear weapon/nuclear capable weapon nations, corresponding to four civilisations - the Sinic, the Jewish, the Hindu, the Islamic...Today there is a balance between four white and four non-white nuclear weapon/nuclear capable weapon nations. There is no reason why this balance should be disturbed in favour of the white nations by reducing the non-white representation."

The argument is not only racist it is also patently dishonest, there can be no disarmament by legitimising the nuclear proliferation of Israel, India, Pakistan or China.

Even the end of the Cold War is used by the defenders of nuclear weapons in India to argue for proliferation. It is suggested that the bipolar world through its system of alliances permitted an "external balancing" which obviated the need for developing nuclear weapons by several other countries. However, since this has become impossible with the collapse of the Soviet Union, they argue several middle ranking developing countries feel the need to acquire their own nuclear capability- a sort of "internal balancing" to maintain their strategic autonomy and independence.

Yet another argument is that since some nuclear proliferation has already taken place, why not shift the focus - from preventing nuclear proliferation to "managing" it Thus an Indian bomb analyst has suggested that a supplementary agreement to the NPT be signed to create what he calls "an Equal Opportunity NPT" which would help bring the nuclear hold-outs against the treaty into the regime, without undermining it. This, it is suggested, could be followed with an arrangement, prohibiting all further nuclear-weapon related activity world-wide, and which would ban all future manufacture of nuclear weapons, impose a comprehensive verification regime on all countries. The long and short of these arguments is that as long as nuclear weapons continue to be seen as a potent currency of power internationally, there would not only be proliferation, but also many arguments to rationalise their spread.

Clearly, the alternative to a discriminatory non-proliferation treaty would be genuine and complete nuclear disarmament through credible ways leading to the elimination of nuclear weapons. Disarmament can only be promoted by actually disarming and not by proliferating even if in a limited manner. The end of the Cold War has knocked out what ever basis there might have been for nuclear weapons. And although there is a long way to go towards a nuclear weapon free world, elimination now appears to be a realistic and necessary goal.

Within the overall context of the end of the Superpower rivalry, several factors have made it conducive today to push the agenda for elimination of nuclear weapons. The successful adoption of the Chemical Weapons Convention is one such factor. The inability of the declared nuclear powers to push through an indefinite extension of the NPT is another. The movement forward on a Comprehensive Test Ban Treaty and on fissile material cut-off is yet another factor that shows that the disarmament and non-proliferation agenda can be pushed on several complimentary, converging and mutually reinforcing tracks.

The crux of the matter is to unequivocally repudiate the security doctrines and policies which justify the development, possession and use of nuclear weapons, and to make a commitment to the objective of eliminating nuclear weapons. Once this is done, several approaches are possible to meet this objective.

One such approach in *the* West Asian and South Asian contexts is that of proposing the setting up of Nuclear Free Zones. Such zones are good transitional mechanisms to global disarmament. At the same time they represent a principled and yet realistic framework for nuclear restraint in a region.

The proponents of nuclear weapon free zones argue that there is a powerful political case for nuclear weapon free zones because they address the issue of security without sacrificing national sovereignty of legitimising the possession of nuclear weapons by a handful of states. While they are a potent contribution to nuclear disarmament, they do not at the same time negate a larger global effort

It is difficult to see how the path to nuclear restraint and disarmament either in West Asia or South Asia can go via the NPT. Any restraint must not single out some governments for disarmament while the declared NWS (and Israel) continue to possess nuclear arsenals. Thus, for example, in mid-February, in Cairo, the Arab league members - to "make the Middle East a zone free from atomic, biological and chemical weapons." The draft is to be presented, according to news reports, to the Arab League foreign ministers for ratification in March in Cairo.

The idea of a Nuclear Weapons Free Zone has been mooted in the South Asian context too - by Pakistan and by peace activists even in India.

Analysing India's options for example, one such activist has argued that in the absence of a coherent nuclear doctrine, India's nuclear choices are painfully limited. The choice of closing the nuclear weapons option seems politically unfeasible given the hype and jingoism over Pakistan's nuclear capability. Implementing the nuclear option and announcing that India has nuclear arsenal could be even more problematic as it would elicit a similar response from Pakistan and at the same time provoke China into a nuclear-adversarial relationship which would result in an unequal nuclear arms race.

But the option for India - engaging Pakistan in a bilateral dialogue to establish a nuclear weapons free zone in South Asia - actually provides a workable alternative to the discriminatory nuclear non-proliferation treaty while supporting genuine disarmament.

To quote, once again, an advocate of the South Asian Nuclear Weapons Free Zone: "As transitional steps, the two governments should agree not to deploy missiles, to freeze fissile material production, and not to test or use their nuclear weapon capabilities, as well as take confidence building measures. This will lay down the ground for involving other South Asian states and the nuclear powers in negotiating a Nuclear Weapons Free Zone agreement - prevent the manufacture or deployment of nuclear weapons in the region, the targeting of such weapons at it, or their transportation through it."

However given the existence of weak governments in both India and Pakistan at the present juncture, such a regional initiative is not possible without global measures towards nuclear disarmament. Perhaps this is true even of West Asia.

Some Nuclear Weapon States such as the US have tried to push through the Nuclear Weapon Free Zone idea in South Asia. But they are bereft of any moral legitimacy in arguing for such an initiative unless they themselves are seen to make proportional nuclear disarmament commitments.

Thus peace activists in South Asia, for example, have been arguing that global agreements such as CTBT, no first use and fissile production cut-off are a pre-condition far a South Asian Nuclear Weapon Free Zone initiative. They are necessary pre-conditions but not sufficient. The argument is that to be effective in breaking the South Asian Impasse , CTBT, no first use and fissile material production cut-off must be followed by (a) deep cuts in strategic nuclear weapons of the five Nuclear Weapon States; (b) an universalisation of the INF Agreement; (c) a substantial reduction of strategic missiles; (d) quick elimination of battlefield tactical weapons; and (e) progress in verification agreements.

Needless to say that if the NPT is extended indefinitely this April it would become so much more difficult to take these major steps to eliminate the bulk of the world's nuclear arsenals.

Indeed , even strategic analysts in the nuclear weapon states realise that unless some genuine progress is seen to be made in this direction, the NPT cannot be extended unconditionally and indefinitely. At the last count the US needed 15 to 20 more votes than it now has out of the 169 signatories to the NPT to get it extended indefinitely by even a simple majority. The prospects of a decisive majority are little.

Writing in the New York Times on Feb. 15 1995, Selig Harrison, a fellow of the Carnegie Endowment for International Peace, suggested that: To rescue the non-proliferation treaty, the nuclear powers should take two immediate steps to demonstrate their recognition of their Article VI obligations. First, the US and Russia should begin negotiations on a Third Strategic Arms Reduction Treaty (START III) that would set a timetable for a gradual decrease of nuclear weapons below the level of 3,500 each negotiated by the Bush Administration in the START II agreement of 1991. The timetable should project progressive and balance reductions down to 600 nuclear weapons...Second, the START III dialogue should be accompanied b five-power negotiations on the 'treaty of nuclear security and stability' proposed by President Yeltsin in the UN in September . He envisioned 'further steps' to limit Russian and American strategic nuclear weapons, together with a cap on further increases in French, Chinese and British nuclear arms while the US - Russian build down progresses."

Then he suggests that getting down from the 660 to 0 would require a broadened dialogue embracing nuclear capable states such as India, Israel and Pakistan. And elimination, he says, will become a realistic possibility only if continuing progress is made in establishing secure safeguards against further proliferation. This certainly represents a way forward.

Only once the extension of the NPT is predicated on the specific movement forward on several complimentary, converging and mutually reinforcing nuclear disarmament tracks, does it make sense even to argue what kind of rolling extension of the treaty should be supported.

Bharat Bhushan, in WISE News Communique

Military Experiments

It has now been admitted by the US Department of Defence that in the dawn of the nuclear age it undertook deliberate radiation experiments with children, pregnant women, prisoners, mentally retarded persons and the terminally ill. This was done during the same time period in which the US and other victor nations prosecuted Germany for the same crimes against humanity.

These types of crimes and duplicity appear to be still practised by the US military, as recently as in the Gulf War. It also appears to be part of the military policy underlying the HAARP project now underway in Gakona, Alaska, with planned implementation in 1997. This High Frequency Active Auroal Research Project (HAARP) will heat the ionosphere using powerful beams of non-ionising radiation. Potentially this will set the Earth into vibrations or oscillations similar to the Earth's axis wobble. The joint US Army and Navy project involves interference with the Earth's magnetosphere with unknown effects at the opposite magnetic pole near Australia and New Zealand. Professor Richard Williams has denounced the experiment as "irresponsible and dangerous". Alaskan Federal Aviation Authority (FAA) personnel, pilots, communications engineers and others have raised alarms about HAARP'S interference with radio communication. They were overruled by the national FAA which approved the project proposing that the problems be "mitigated". On the other hand, the military claims the transmission interference problems are too great to allow for locating HAARP to close to any military facility. The capability of HAARP is greater than *the* total output of the more than half-a-million US ham radio operators using their maximum allowed power. Communication with isolated Arctic villages and bush pilots is often a life and death matter in the North.

The inventor of HAARP is Bernard Eastlund. He was hired by ARCO "to find a use for their Alaska Birth Slope gas deposits." Patents held by the ARCO subsidiary building HAARP describe an ionospheric heater capable of stopping missiles, changing weather and disrupting global communication. The HARP project appears to be an implementation of Easdund's patents.

The Military has made increasing use of non-ionising radio waves, like the polarised pulsing transmissions planned for HAARP, in recent years as an electronic "fence" at Greenham Common and other military bases. According to *Defense News* an electro-magnetic pulse (EMP) weapon designed to mimic the flash of electricity from a nuclear weapon was an example of technology used in Operation Desert Storm. The Gulf War has been described as an "electronic battleaeld" with 14,000 electronic detectors each sounding up to three times daily during the war. This electronic environment may well be one of the triggers which left more than 16,000 veterans with Gulf War Syndrome. The preponderance of current research shows that non-lonising radiation can promote cancer growth, cause disorientation and many other physical effects.

Certainly admitting to wrong doing in the past and making some attempt to compensate the victims is a step forward for the military. However, such action becomes hollow, dishonest and reprehensible if the gross violations of human rights continue under another guise.

Until the US ratifies the United Nations Human Rights Covenants and joins the international community of nations which recognise and uphold those rights, such purges of past mistakes will not be taken seriously. The right of all humans to life and health should be a constituent part of a genuine democracy. Experimenting with electronic zapping of the human body, disruptions of weather and wiping out of essential communication in the guise of national security constitutes a crime against humanity and perversion of both the Constitution of the United States and the Charter of the United Nations. It undermines the very notion of security.

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Dr. Rosalie Bertell

Letter Box

So Little For So Much

It has happened yet again. Every year the nuclear establishment manages to (mis) appropriate the lion's share of government funding for science and technology. One would have thought that in the post liberalisation, market driven economy the criteria of efficiency and minimum level of performance would be applied to nuclear industry as well. But no such luck. The gross distortions in our science policy which have favoured atomic energy projects, persist even today. A quick look at this year's budget allocations tell its own story.

Nucleocrats have managed to allocate themselves more money than the entire budgets of the Department of Science and Technology, the vast network of 29 CSIR Laboratories, bio-technology, and the Department of Non-conventional Energy Sources, combined! Of the energy budget, 85% goes to "develop" nuclear technology and all the so called non conventional energy sources are allocated the remaining crumbs.

Comparison of the atomic energy budget with the budget for priority sectors like primary education is equally revealing. Despite all the crocodile tears of the finance minister about the crucial importance of elementary education, the total allocation for primary education (Rs 651 crores) and secondary education (Rs 670 crores) is still less than the nuclear largesse.

Regular readers of Anumukti need not be told about the "achievements" of DAE despite the thousands of crores that have been pumped into it for decades. What is alarming is the feet that today, DAE is not in a position to make even false promises. It has already admitted that the uranium reserves in the country are sufficient only for about 10,000 MW of installed capacity. The Indian breeder development programme has been a disaster, like all the other such programmes in the world. The cost of developing any revolutionary reactor technology is mercifully ruled out. The writing on the wall is becoming more and more visible. Atomic energy has nothing to offer. So what is the money going into7

Budget Allocations

Department	Budget in Rs (Crores)
Science and Technology	**418.85**
CSIR Laboratories	**411.03**
Bio-Technology	**96.52**
Non-Conventional Energy Sources	**248.38**
Atomic Energy	1402.15

It would have been gratifying if the answer had been "for research into decommissioning and waste management aspects." Moral responsibility is not a word to be found in nay nuclear glossary, but the nucleocrats owe the society at least some effort towards cleaning up the mess that they have created in the last four decades.

Sanjay Havanur

Against Toxic *Dumping in Mysore*

I am receiving my copies of *Anumukti* regularly and enjoying every one of them. The recently introduced *AERB Column* is, in my opinion, something of a victory for our movement I hope that people within the nuclear establishment get to read *Anumukti* and especially the AERB *Column.*

You are probably aware that the Karnataka Raitha Sangha is agitating against the dumping of toxic waste in the vicinity of three villages in the Chamaraja Taluka of Mysore District. The agitation is being led by Sri Mallesh, the secretary of the Sangha. I have written to him and to The Star of Mysore, a local English newspaper expressing my support. I feel that the toxic waste which is now proposed to be dumped cannot but include some waste from the uranium enrichment plant at Ratnahalli which is just 4 kilometres outside Mysore.

Asha Vombatkere
New Delhi

Tragic Consequences of Ignoring Sakharov's Warnings

After the success of an extremely powerful test of a Hydrogen bomb in 1955, Andrei Sakharov began to worry about its biological effects. Animal studies conducted with his biologist colleagues indicated that the ingestion of strontium 90 would cause both immediate and delayed damage to the immune response, and he calculated that each atmospheric test with a 50 megaton yield could cause a million premature deaths world-wide.

In 1958, Nikita Khrushchev was eager to reach a testing moratorium with the Americans and permitted Sakharov to publish his concerns. And indeed, neither the United States nor the Soviet Union conducted any above-ground tests in 1959 and 1960, much to Sakharov's satisfaction. But in 1961, after a fruidess, heart-breaking meeting in Vienna between Khrushchev and newly elected President John F. Kennedy, Sakharov was devastated to learn that Khrushchev had ordered the testing of hydrogen bombs of nearly unlimited explosive power - equivalent to 25,000 Hiroshima bombs - powerful enough to accelerate the death of several millions , according to Sakharov's calculations. When Sakharov questioned Khrushchev at a meeting later that year, he was denounced as "politically naive" and was thereafter banished from the Soviet nuclear establishment.

There is now considerable evidence of the remarkable prescience of Sakharov's predictions and the tragic consequences of ignoring is warnings. For example, in 1992 the Canadian physician R. K. Whyte demonstrated in the *British Medical Journal* that atmospheric fallout caused extraordinary increases in neonatal mortality and stillbirths in the United States and Britain after 1950, thus validating Sakharov's fear that there would be immediate as well as delayed harm to those born during the bomb testing years.

But Sakharov also predicted that man-made radiation would accelerate the mutation of all micro-organisms, leading to the inference that baby boomers born after 1945 with weakened hormonal and immune systems would eventually encounter newly mutated and therefore more lethal strains of bacteria and viruses, sexually transmitted as in the case of AIDS . In a 1990 article in the *American Journal of Public* Health, the Atlanta Centres for Disease Control affirmed that, because of AIDS, the mortality rates of men in the 25 -44 age group has started to rise in the 1980s, for the first time ever . And we now know that the organisms responsible for many infectious diseases, including tuberculosis and those associated with the AIDS syndrome, are mutating so rapidly as to resist traditional antibiotics, creating an unprecedented public health crisis.

Finally, mortality data broken down by age and published annually in the United Nations Demographic Yearbook indicate that in the 1980s, the baby boomer's mortality rates deteriorated in all the major nuclear nations except Germany and Japan (cited in *International Journal of Health Services*, April 1994).

Meanwhile , in the 1980s, the mortality rates for 25-44 year olds - the most productive group in the labour force - continues to decline in Germany and Japan. Thus we are left with the ironic speculation that because those two countries lost World War II, they were precluded from exposing their progeny to emissions from the manufacture and testing of nuclear weapons, and may therefore be said to have won "World War III".

The lesson to be learnt from the history of the atom bomb is that both the Western world and the former Soviet Union have paid a great price for ignoring the warnings of such great scientists as Albert Einstein, Niels Bohr, Linus Pauling, and Andrei Sakharov.

Jay M *Gould in*
Bulletin of Atomic Scientists
January/February 1995

Letter from Eastern Europe

What do greenies and anti-nukes do with their holidays - or what they fondly imagine will be holidays? Generally it seems, we turn them into workadays, if not by coming to Vedchhi to write articles like this one, then by going to places like Eastern Europe and getting roped in (willingly I must admit), to fight with plans by the European Bank for Reconstruction and Development (EBRD), Slovensky Energeticky Podniky (SEP) the Slovak electricity producer, Electrieite de France (EDF), Seimens and Bayernwerke, to complete the construction to western standards of two Soviet-designed VVER nuclear plants in Slovakia. Two-three months solid work that ended with the Polish Ecological Club (Polski Klub Ecologiczny) and the author all over Polish TV and newspapers.

Wait! This is getting ahead of myself. It all started innocently enough, when my spouse Mishka (who is Polish by birth) and I toured Poland and Czechoslovakia for about two months in November/December' 1994. It seemed natural in the course of our other activities, to call in on various environment groups in Poland and Czechoslovakia. We spoke in our travels to activists in the Green Federation and the Green Foundation, and the Council for All beings and to Tomasz Terlecki in Polski Klub Ecologiczny in Cracow, the medieval city that is the cultural heart of Poland. Tomasz indicated that he might have something up his sleeve to work on in the shape of a nuclear reactor in Slovakia called Mochovce', and gave me a file of material relating to it. We then spent a week with Hnuti Duha, a radical grass- roots group in the city of Brno, in Czechoslovakia - also an interest'ing medieval place, but quite different from Cracow. Hnuti Duha just happened to have extensive files on the safety of Russian-design nuclear power plants, which naturally, I raided, since Mochovce was a Russian-designed plant.

Hnuti Duha is strongly involved in opposition to the Temelin nuclear power plant, as well as with the already operating Dukovany nuclear plant, which just happens to be the same kind of plant as the Mochovce plant: a Soviet-designed WER213/440. Temelin is a Soviet-designed WER-320/1000 plant, which is due to be completed by another western consortium of which the main player is Westinghouse. As well as its nuclear concerns, Hnuti Duha is also very much concerned with uranium mining and waste issues, energy, and animal rights.

Uranium Mines: *The Spearhead of the Assault*

Nuclear power plants run on uranium, and while we were with Hnuti Duha, they took us to see the uranium mine that supplies the Dukovany nuclear plant with fuel. Dukovany has a contract with a local Czech firm named Diamo for its 56t/y consumption. Diamo operates a very costly and messy mine at a place called Rojna, 40 km Southwest of Brno, and a meeting was set up for us to talk to local people.

The locals showed us a monster tailings dam containing 1.1 million tonnes of tailings and 17 million tonnes of 'sludge'. They showed us a smaller tailings dam in what used to be a pretty valley consisting of sludge and piles of waste (including we were told, cyanide waste) that reflected the setting autumn sun in interesting shades of toxic green.

Later, they took us to a local meeting hall, not 300m from the big tailings dam, where they entertained us with limitless home-cooked food and Czech beer (brewed since 1326) and with tales of the mining company and their so-far fruitless struggle to get rid of it. The contrasts and the similarities with our situation in Australia were startling: Rojna was a smaller, yet a much dirtier operation than anything I had come across in Australia. Maybe it resembles mines in India. These people lived, not 500 or 100 km away from it as they do in Australia, but 200-300m away from it. The dust from the dried tailings sludge dusted their crops, their animals, their children, and them.

Radon measurements were not even taken by the company because it was said that measurements done at another mining centre were 'enough'. Soil sampling had turned up thorium - a decay product of uranium. The mining company said it had 'come down in the rain'. Thorium is not a component of fallout either from Chernobyl or from testing, so there is no way it can have come down in the rain. Cattle deaths had increased fourfold in the 1990s, and illnesses amongst schoolchildren had risen by 100% in one year.

What upset people most however, was the attitude of the company and the authorities. According to the leader of the local agricultural department, I'm not drinking milk, so I don't care'. The mining company simply maintained that the concerns of local residents were being stirred up by nasty environmental activists like Hnuti Duha.

> *Now that the place is already spoilt, we might as well use it for a dump*

Indeed, while the company maintained on the one hand that there were no problems from its operations, it argued on the other hand that the area had already been 'spoiled' and should be used as a kind of 'national sacrifice area' for the disposal of various toxic wastes, an unappetising prospect for the locals.

As we took the train from Brno to Rojna, we observed dense forests, narrow valleys, a covered medieval bridge, a castle on a crag, and ancient churches and villages. Just the place, the folks from Hnuti Duha

Cold us, for a nuclear waste dump for the Dukovany reactors. The villagers had told us that they were indeed, a 'candidate site' for a national nuclear waste dump. After ah, they had mine tailings and toxic waste, so why not a nuclear waste dump?

A major theme for every Eastern European environment group is energy. This picture is completed by the major nuclear concerns in the Czech Republic and Slovakia - concerns which, if Mochovce and Temclin successfully reach completion, may ripple out to affect unfinished nuclear plants in Poland also. Also critical to the Eastern European energy picture are the activities of the multilateral development banks such as EBRD, Eximbank, and the World Bank, and programs such as Phare and Tacis.

The Worst of Both Worlds

While these agencies arc supposedly funding 'sustainable' and 'least-cost' energy strategies, they are in fact heavily involved in promoting projects which are imposing the worst aspects of Western development, while retaining the worst aspects *o{* the old Communist structures. Meanwhile, those things that the Communist regimes got more- or-less right (such as the heavy emphasis on rail transport and on cheap public transport in general) are dismantled or downgraded.

Current government policies in Poland and the Czoch Republic reinforce this trend. The Czech government for example, now considers the excellent train and tram system that it has inherited from the Communists, a system that would be the envy of supposedly advanced Australia, and which compares favourably with the German one with fares at about l/5th the price,to be 'superfluous', it explicitly intends to run down the rail system in favour of massive investments in roads funded by multilateral development agencies whose charters include commitments to 'sustainable development'.

Meanwhile, the Temelin nuclear power plant, consisting of 2-lOOOMwe VVER-320 plants which was being built with Russian help up to 1990, is to be completed with money from Eximbank and the help of Westinghouse. Never mind the fact that in 1990, Western governments were saying that Russian-designed nuclear plants in Eastern Europe were/are accidents waiting to happen, and that the only sensible thing to do was to close them down. Never mind the fact that Austria, whose own historic capital, Vienna, is not so far over the border, and who sensibly abandoned nuclear power in 1978, is strorgly apposed to the completion of Teme in. Never mind the fact that the local population are utterly opposed to it, and that civil disobedience actiors (coordinated by Hnuti Duha) have already taken place, and that the previous Prime Minister of the Czech Republic has declared his opposition to it. Never mind the $USi-2 billion cost of trying to complete the plant to 'western' standards. This is one Communist inheritance that the powers-that-be think must be preserved and built on at all costs.

A similar situation holds in Slovakia, whose Mochovce nuclear plant has become a major European issue, with the Austrian government and a network of environment groups in Austria, Germany, the UK, Slovakia, Poland, Hungary, and the US opposing the project.

Mochovce is an earlier (and hence, according to the Western nuclear industry in 1989-1990-91, a more dangerous) VVER440/213 plant. Construction on Mochovce 1&2 was suspended in 1990 due to lack of money, and the EBRD and EDF/Bayemwerke/Seimens have offered to complete it to 'western' safety standards.

The EBRD has at least, due to its own guidelines for project assessment, been forced to insist that the project sponsors, SEP and EDF, issue a complete environmental impact statement, least - cost analysis, and safety documentation. It was this that I was asked by Polski Klub Ecologiczny to critique.

Meanwhile, back in cultured and medieval Cracow, where baroque and Gothic churches front onto narrow, supposedly car - free streets full of bookshops and cafes where the dissidents used to hang out, and where every third person seems to be wearing a clerical garb of some kind, a few activists also struggle with green issues.

Cracow itself was presented in the 1950s by the Communists with a vast steelworks at Nowa Huta, in an attempt to proletarianise the place. The attempt failed spectacularly in the 1970s as the steel plant became a hotbed *of* strike activity and massive demonstrations round the only church permitted in the area, demonstrations that succeeded in toppling the regime. But the steelworks has created a permanent greyish brown pall over the city.

Automobile is King

Meanwhile, now that Communism has gone, the push is on to give more and more space to the private car which apart from the steelworks has become the main source of pollution and of course, to downgrade the once excellent tram and bus systems. Cracow is lucky in that it does have a strong bicycle lobby and it and the green federation are engaged in an effort to rid the old city of cars, and make it an area for cycles and pedestrians,. An attempt has already been made to rid the medieval city of cars, but implementation is less than wholehearted. Cars still manage to clog the footpath next to the 11th century church of St Anne and the 16th century church of St Peter and Paul and the University Library.

Dhanbad of Europe

Not-so-sunny and not so medieval, polluted, grubby heavily industrial Katowice and Chorzow, where Mishka was bought up are not so far from Cracow, though all-too -radical surgery has been done to the timings of the trains that used to make the trip between the two cities so easy. Katowice represents much of what is problematic in today's. Poland.

Katowice became an area of mines and factories as long ago as the 17th century, and developed after the partition of Poland under the Austrians and the Prussians and then under prewar and Communist Poland into a major industrial area that produced 10% of the worlds black coal, and much of the global output of greenhouse gases. It is a vast conglomeration of genteely decaying 19th century apartments whose facades turn an interesting shade of dark green/black because of the pollution, of vast monolithic Communist- era apartment blocks, gigantic and decrepit mines and steelworks, railways, and elephantine piping.

Katowice has been described as 'the most polluted place in Europe'. I do not know that this is any longer true: The sheer volume of what used to be the dominant form of pollution, industrial pollution, has been slashed by the massive closure of many enterprises, as well as the fitting of some pollution control equipment. To the naked eye at least, Ostrava in the Czech Republic resents a more appalling vista, with vast clouds of smoke and steam belching from an old steelworks. And India certainly has much more diabolical industrial landscapes (for example around Dhanbad) as well as more choking auto -pollution, especially in Delhi.

But Katowice has massive soil and water pollution, and big problems with mine wastewater. And the public transport situation is much worse than in Cracow, where there is a pro-public transport lobby. As in Cracow, pollution from motor vehicles is fast becoming the major source of air pollution. Plans exist for massive superhighway construction round Katowice, which are held up only by the lack of money.

While the public transport services deteriorate further, fares are raised continually, and the regional government last year (1993) actually *apologised* for being unable to get *rid* of the trams - the mainstay of the public transport system - until sometime past the year 2000. The urgent need is of course, to upgrade and extend, rather than get rid of, what was once an excellent tram system. To keep things in perspective however, it must be said that the system in Katowice would have to deteriorate much further in order to reach the abysmal levels of public transport in Australian cities.

At a national level, this deterioration in public transport manifests in the continual cutting back of 'ordinary' train services, while more up-market 'intercity' and international trains costing ten times as much continue to be promoted. This is a phenomenon that will be familiar to Indian readers.

Striding Toward Energy Inefficiency

The problems of which Katowice is the main example go to the heart also of Communist-style Polish and Eastern European energy-use. Communist-style industrialisation meant the establishment of heavy industries with little or no regard either for the environmental impact of those industries or for efficiency in their use of energy. Poland, Czechoslovakia (now Czech Republic and Slovakia) and Hungary thus have one of the largest ratios of energy-use per unit of GNP. (This figure should be used with care, as GNPs expressed in $US say more about what a country's currency is worth on the money market than they do about goods and services actually available to local people. Thus, incomes it Poland, and other countries expressed in $US tell little about the real living conditions of people in those countries: - only that they are going to find overseas travel prohibitive.

This important point accepted, it is nonetheless true that massive opportunities exist for improvements in energy use efficiency, especially in the wasteful industrial sector. At the same time, those areas in which the right things were in fact done by the Communist regime, notably the widespread use of industrial waste heat for other industries and domes-

tic use (you can see the elephantine pipes all over Poland, especially round Katowice) - should be seen as things to build on and improve. The danger *is* that in the headlong rush to capitalism, they will be forgotten, and the energy efficiency of the country may in fact deteriorate.

Nuclear power is one area in which governments and their western partners perversely do want to build on and improve the Communist legacy. It is the one area where that legacy is most dangerous.

John Hallam.

The Arrogance of Resistance.

I listened attentively as a federal magistrate, explaining her guilty verdict, lectured me on the "arrogance" of people like me who place their beliefs above laws democratically arrived at by elected representatives of the people.

Was it arrogant of Martin Luther King, I wondered , to put his own beliefs above the democratically arrived at Jim Crow laws of the duly elected legislators of Alabama, Mississippi and Georgia?

Was it arrogant of Mohandas Gandhi to violate colonial salt tax laws duly enacted for India by the mother of parliaments?

And what might Magistrate Kathleen A. Jaudzemis think of the arrogance of Emma Goldman and Susan B. Anthony and other suffragettes whose violation of duly enacted all-male voting laws helped open up the

Radiation Like Death Comes Unexpectedly

The Radioactive Fallout of Enron Power Project

A Study of Radon Concentration Released into the Atmosphere due to Burning of Natural Gas is a tide of a paper by M. C. Subba Ramu, T. S. Muralidharan and K. G. Vohra of the Division of Radiological Protection of Bhabha Atomic Research Centre. In this paper they present their observation and estimate the dose received by a bystander due to burning of natural gas by the Tata Thermal Power Station and the Rashtriya Chemicals and Fertilisers at Trombay. They find the dose varies from season to season between 0.04 to 2.6 rems per year depending on various factors like wind, precipitation, geographical features, etc. They also state in this paper that the release of radon due to the burning of natural gas reduces considerably when the gas is processed to remove impurities and fractionated to recover the heavier hydrocarbons. In this process about 30 to 70 percent radon gets removed from natural gas.

Shri Ashok Kumar from Bombay, has raised this issue in connection with the proposed Enron power plant at Dabhol on the Konkan coast of Maharashtra. Again depending on various factors like wind, precipitation and geographical features, previous processing of gas to remove radon, etc. people in the vicinity of the plant might be in for a radiation dose of 0.4 rem to 25 rems per year in addition to other pollution burdens. 25 rems per year is 2500 times the dose recommended by the International Commission on Radiological Protection for the general public.

At a time when the newly installed government in Maharashtra is in the process of rethinking the Enron Project, it might be prudent for it to take this hitherto 'unknown' fact into consideration. Over the long term, this would be of greater consequence then the back-breaking financial burden imposed by the project.

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American political system, including the judiciary, to women?

The thought of those earlier practidoners of civil resistance brought me comfort as the magistrate droned on, citing with satisfaction the ruling of federal appeals court which upheld the conviction of four peace activists who had cited "God's law" in defence of the disabling of a Missouri missile site capable of launching a 1.2 megaton hydrogen bomb toward Soviet Russia.

Magistrate Jaudzemis was right. The higher court's ruling against the 1984 "Silo Pruning Hooks"(Carl and Paul Kabat, Helen Woodson, and Larry Cloud-Morgan) governed her decision in my case. International laws forbidding crimes against humanity did not justify my trespass at the nearby Air Force base which houses the headquarters of the federal government's nuclear war-fighting capabilities.

And she was right, I believe, in holding me accountable by sentencing me to the maximum of six months (a modest penalty in comparison with the punishment meted out these days to many for lesser crimes).

Like King, Gandhi, the suffragettes and others who break the law out of principle, I don't expect to escape responsibility. In fact, it is the punishment which sometimes paves the way for changes in the law. This willingness to "take the rap" is what transforms arrogance into humility and makes civil resistance a potentially powerful instrument of social change.

If laws sanctioning nuclear weapons and nuclear war were truly the product of legislative decisions democratically arrived at, as the court contends, then civil resistance would indeed be an act of arrogance. But they are not. Such laws are conceived in secret, born in ignorance, and shaped by vested interests which leave little room for fair and honest debate.

Just as Jim Crow and the all-male suffrage once rested on the bedrock of legal assumptions unchallenged by generations of law-makers, so do the assumptions underlying today's national secret laws. Missing from the votes over nuclear weapons systems and the billions of dollars appropriated for them is any consideration of the realities of nuclear weapons and consequences of their use.

Policies based on pre-nuclear war-fighting concepts form the basis of laws that authorise the building of many thousands of nuclear warheads, some of them ten thousand times more powerful than the biggest conventional bomb ever dropped in World War II. Can it be said that such mindless genocidal policies are the product of laws democratically arrived at? Or does not the absence of rational discussions - in the halls of Congress and in the body politic - constitute a form of secrecy as effective as the strictest censorship laws?

Secrecy is the enemy of democracy. That is the point made by an extraordinary activist, Mordechai Vanunu, a former nuclear technician who risked his freedom by breaking the law eight years ago to tell a British newspaper about Israel's secret nuclear weapons facility where he had once worked. For this he is paying the price of 18 years in solitary confinement in Israel's maximum security prison. Vanunu believed that if Israel was to take this awesome step into nuclear weapons, thereby triggering a nuclear arms race with its Arab neighbours , then the decision to do so should be democratically arrived at, not taken in the deepest secrecy.

So is it, too, with Fr. Frank Cordaro, Brian Terrell, and others who have taken the lead in shining a light into the darkness of the Strategic Command (StratCom), field headquarters for US nuclear war-waging by breaking the trespass laws that protect Offutt Air Force Base near here. Although StratCom's role and mission are a matter of public record, the global implications of its existence are in every protected sense a secret to Congress and the American people.

Was it an "undue display of self-importance" for Mordechai Vanunu to take it upon himself to tell his fellow citizens of the potential nuclear oblivion prepared for them by their government in strictest secrecy?

Was it "overbearing haughtiness" of Frank Cardaro and his colleague Brian Terrell to put their bodies on the line at StratCom in hope of reaching the national conscience on the terrible secret within?

Or are those two just humble prophets of a reality that may some day be as unquestioned as the truths of Gandhi, King, Emma Goldman, and Susan B. Anthony.

Either way, I am happy to be in their company.

from Sam Day

THE EDITOR DESERVES CAPITAL PUNISHMENT FOR OMITTING THE LAST PAGE IN THE PREVIOUS ISSUE

The Disaster Last Time

The whole, last page went missing. 11 My fault and I am sorry. The article to suffer amputation concerned the resolutions passed at the seminar on "Nuclear Safety and the Public" organised by INTACH in Delhi on February 3rd and 4th.

The following are some of the missing resolutions:

10. In view of the rigorous clinical tests carried out at Rawatbhata, and the statistically significant increase in incidence of diseases and deformities found amongst those living in the immediate vicinity of the plant, an independent study should be initiated to determine the safety implications of various plant operation practices.

11. The public right to information must be codified and given concrete form in terms of entitlements, as an intrinsic component of the process of approval of nuclear energy projects, in particular,

i) the right to appraise the need and rationale of the project.

ii) the right to appraise the hazards and associated risks to the public.

iii) the right to examine and set safety standards and norms.

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